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**LASIANTHAEA MACHUCANA (ASTERACEAE), A NEW SPECIES FROM
JALISCO, MEXICO**

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ABSTRACT

A new species, *Lasianthaea machucana* B.L. Turner, is described and illustrated from Mpio. Tenamaxtlán, Jalisco, México. It is related to the widespread *L. palmeri*, but differs from the latter in a number of characters, including larger heads with enlarged outer involucre bracts having elongate spreading hairs. A map showing the distribution of these two taxa in Jalisco is provided.

KEY WORDS: Asteraceae, *Lasianthaea*, México, Jalisco

Routine identification of Mexican Asteraceae has revealed the following novelty. This brings to 40 the number of *Lasianthaea* species to be recognized in my forthcoming treatment of the genus for the *Comps of Mexico* (Turner, in prep.).

LASIANTHAEA MACHUCANA B.L. Turner, *spec. nov.*, Figure 1. **TYPE:** MEXICO. Jalisco: Mpio. Tenamaxtlán, Recorrido de Tenamaxtlán a los Picachos, pine-oak woodlands, 20 Aug 1994, J.A. Machuca N. 7217 (HOLOTYPE: LL!; Isotype: GUADA).

Similis *L. palmeri* (Greenm.) K. Becker sed bracteae involucri amplificatae et coriaceae sunt, serie exteriore foliiformi cum pilis effusis 1-2 mm longis.

Suffrutescent herbs to 50 cm high, the roots unknown. Stems moderately hirsute, the vestiture ca. 1 mm high. Leaves opposite throughout, ca. 5 pair to a stem, shorter than the internodes and not much reduced upwards; petioles 2-5 mm long, pilose; blades ovate, 6-7 cm long, 3.0-3.5 cm wide, pubescent above and below with rather rough stout pilose hairs, especially along the 3-5 major veins which arise somewhat above the base, the margins irregularly denticulate. Heads 3 at the apices of primary stems, the ultimate peduncles 4-8 cm long, pubescent with spreading white hairs 1-2 mm long. Involucres campanulate, 2-3 seriate, the outer series composed of 3-5 leaf-



Figure 1. *Lasianthaea machucana*, holotype.



Figure 2. Distribution of *Lasianthaea machucana* (triangle) and *L. palmeri* (circles) in Jalisco and closely adjacent states.

like bracts, pubescent like the peduncles and 1.5-2.0 times as long as the inner bracts. Receptacle convex, ca. 2 mm across, 1.5 mm high, paleate, the pales linear-lanceolate, 7-9 mm long, the apices gradually acuminate, purplish. Ray florets ca. 11, pistillate, fertile, the ligules dark yellow, 3-4 mm wide, 7-10 mm long. Disk florets ca. 50 (estimated); corollas yellow, glabrous, ca. 6 mm long, the tube ca. 2.5 mm long, the lobes broadly triangular, ca. 1 mm long. Ray achenes (immature) trianguloid, winged, at the apex having 2-3 angular cusps 1-2 mm long; disk achenes (immature) radially flattened, winged, the pappus of 2 lanceolate persistent awns 2-3 mm long.

ADDITIONAL COLLECTION EXAMINED: MEXICO. Jalisco: Mpio. Tenamaxtlán, Los Picachos de Tenamaxtlán, pine-oak woodlands, ca. 2100 m, 11 Aug 1996, Machuca N. & Chazaro B. 7932 (LL).

This taxon belongs to the herbaceous elements of *Lasianthaea*, standing somewhat between *L. aurea* (D. Don) K. Becker and *L. palmeri*, possessing the short peduncles of the former, but the general habit and uniformly 2-awned disk achenes of the latter. It differs from both in having very coriaceous, markedly leaf-like, apically spreading outer involucre bracts, which are pubescent with spreading hairs 1-2 mm long. Except for the short peduncles and markedly differentiated outer involucre bracts, I could have readily placed *L. machucana* under the fabric of *L. palmeri*. As noted by Becker (1979), *L. palmeri* is an exceedingly variable species, including dwarf glabrous forms that have received the name *L. xylopoda* W.W. Jones, which Becker did not recognize, nor did McVaugh (1984). The distribution of this complex in Jalisco and closely adjacent regions, so far as known, is illustrated in Figure 2.

The taxon is named for its collector, a prolific botanist working out of GUADA, who was the first collector of the taxon concerned.

ACKNOWLEDGMENTS

I am grateful to Gayle Turner for the Latin diagnosis, and to her and Ted Delevoryas for reviewing the paper.

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McVaugh, R. 1984. *Lasianthaea*, in *Flora Novo-Galiciana* 12:558-575. University of Michigan Press, Ann Arbor, Michigan.

A NEW SPECIES OF *MENODORA* (OLEACEAE) FROM THE SIERRA MADRE
OCCIDENTAL IN EASTERN SONORA, MEXICO

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ABSTRACT

A new species, *Menodora yecorana* T. Van Devender & B.L. Turner, is described from near Yécora, Sonora, México. It is closely related to *Menodora potosiensis*, a localized endemic of eastern San Luis Potosí, México, sharing the general habit, stem shape and opposite leaves of that species, but differs markedly in its glabrous stems and acicular leaves.

KEY WORDS: Oleaceae, *Menodora*, México, Sonora, systematics

The junior author (Turner 1991) provided an overview of the North American species of *Menodora* in which fourteen species were recognized. The present novelty will key in his treatment to *M. potosiensis* Henrickson ex B.L. Turner, a localized endemic of San Luis Potosí, México, but differs in several characters, as noted in the diagnosis.

The only other species of *Menodora* known to occur in the general region where *M. yecorana* is found is *M. scabra* Engelm. ex A. Gray, the latter readily distinguished from the former by its alternate leaves and terete-angulate stems. Because of its bright, highly floriferous, suffruticose habit it is worthy of cultivation as a xeriscape plant.

MENODORA YECORANA T. Van Devender & B. L. Turner, *spec. nov.* Figure 1. TYPE: MEXICO. Sonora: 3.4 km N of Yécora on road to Agua Blanca; two plants on west facing canyon wall in oak woodland among volcanic hilltops; 28°29' 35" N, 108° 55' 11" W, 1520 m, 15 Jul 1997, A.L. Reina G. et al. 97-752

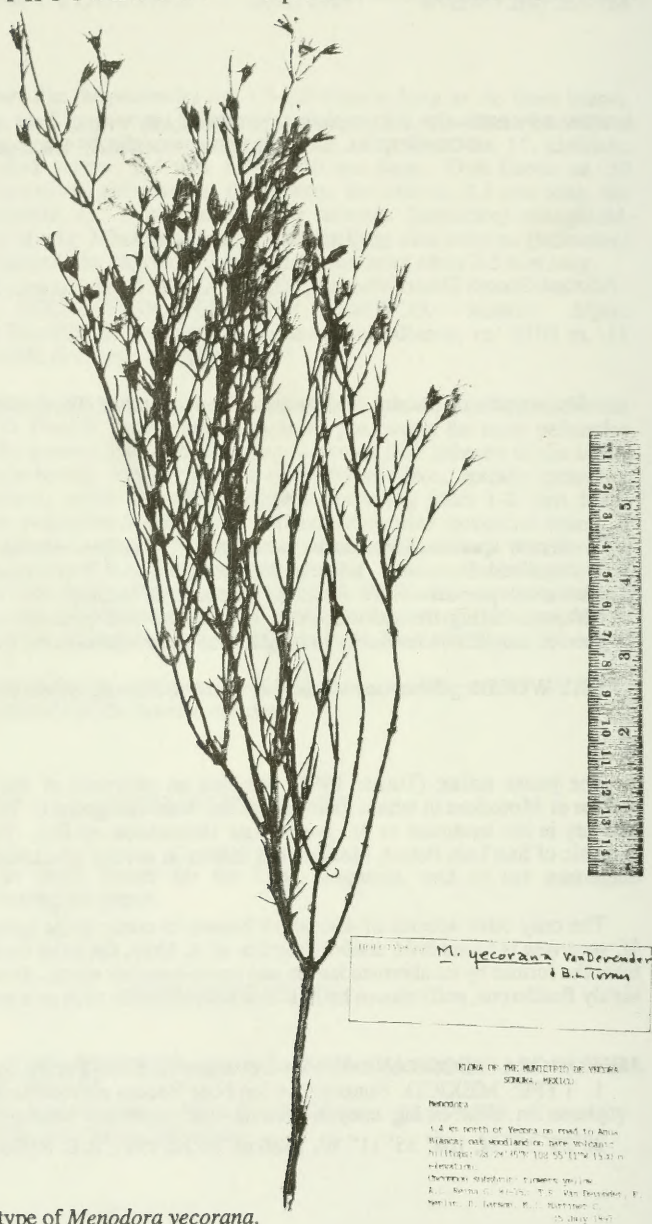


Figure 1. Holotype of *Menodora yecorana*.

(HOLOTYPE: TEX.; Isotypes: ARIZ,CAS,MEXU,RSA; Topotypes: 23 Sep 1997, Reina 97-1188 [ARIZ,ASU,MO,NY,TEX,UCR]).

Similis *M. potosiensis* Henrickson ex B.L. Turner sed glabra aut paene glabra (non dense hispida), foliis acicularibus (non ovatis aut lanceolatis), et tubis calycum ca. 4 mm longis (non ca. 2 mm longis).

Stiffly erect subshrubs 40 cm high or more. Stems markedly 5 or 6 sided, glabrous throughout or nearly so. Leaves opposite throughout, acicular, gradually reduced upwards, those at midstem 20-30 mm long, 0.5-1.0 mm wide, mostly glabrous but the margins often minutely ciliate along the upper one-third. Flowers mostly axillary on erect, glabrous pedicels 7-16 mm long. Calyces 9-10 mm long, glabrous; tubes ca. 4 mm long; lobes 7-9, linear-lanceolate to linear-ob lanceolate. Corollas bright yellow, glabrous without; tubes 5-6 mm long, pubescent within near the throat; lobes 12-14 mm long, 4-5 mm wide. Capsules oval, 5-7 mm long ($\bar{x}=6.0$ mm, $N=13$), 2.5-4.5 mm wide ($\bar{x}=3.8$ mm, $N=13$). Fruit persisting on shrub, 2/3 circumerose on surfaces between fruit pairs; in some pairs, one fruit larger than others, occasionally only one side developing; 1-4 seeds per capsule ($\bar{x}=2.1$, $N=21$); seeds convex externally but range from terete to triangulate to hemispherical, depending on the number of seeds/capsule.

The new *Menodora* is apparently rare, as only two plants were discovered at the type locality, or in similar volcanic ash hills both east and west of Yécora. The vegetation at the type locality is a sparse oak woodland with *Quercus chihuahuensis*, *Juniperus deppeana*, *Dasyllirion* sp., *Erythrina flabelliformis*, *Opuntia robusta*, and *Senecio carlomasonii*. Relatively bare bedrock areas just above supported *Agave polianthifolia*, *Pectis vandevenderi*, and *Tridax yecorana*.

Menodora yecorana superficially resembles *M. scabra* of lower elevations of the Sonoran Desert but, as already noted, is readily distinguished from the latter by its alternate leaves, among other features. Its closest relationship is clearly with *M. potosiensis*, having the habit, markedly angled stems, and corolla of the latter, but differs in leaf shape and stem glabrousity.

Yécora is located in the Río Yaqui drainage of eastern Sonora in the Sierra Madre Occidental. Habitats ranging from grassland at 1540 m elevation near Yécora to pine-oak forests at 2200 m on Mesa el Campanero and relatively high rainfall (more than 1000 mm/yr) support a very diverse flora. Although species are shared with other floras including the tropical deciduous forests of western México and the grasslands of the Mexican Plateau, a substantial percentage are endemic to the central Sierra Madre from western Chihuahua and eastern Sonora south into Durango, and less so north into Arizona and New Mexico. New species described from the Yécora region since 1987 include *Acalypha burquezii* V.W. Steinm. & Felger, *Ageratina sandersii* B.L. Turner, *Ageratina yecorana* B.L. Turner, *Arceuthobium yecorense* Hawksworth & Wiens, *Berberis pimana* Laferr. & Marr., *Echinocereus datae* Laferr., *Euphorbia pionsperma* V.W. Steinm. & Felger, *Hymenocallis pimana* Laferr., *Pectis vandevenderi* B.L. Turner, *Pinus yecorensis* Debreczy & Ráca, *Senecio riomayensis* B.L. Turner, and *Tridax yecorana* B.L. Turner. Descriptions of new species of *Croton*, and *Hymenocallis*, (Victor M. Steinmann, Richard S. Felger, Joseph E.

Laferrière, pers. comm.) are in press while others in *Asclepias*, *Astragalus*, *Eleocharis*, *Macroptilium*, *Rubus*, and *Sphacele* are under study (Mark Fishbein, Phil Jenkins, J. E. Laferrière, Eric Roalson, pers. comm.). Endemic species are especially concentrated on the relatively barren volcanic ash hills near Yécora, e.g., *Croton* sp. nov., *Mammillaria saboae* var. *haudeana* (A. Lau & Wagner) Glass & R. Foster, *Pectis vandevenderi*, *Tridax yecorana*, and now *Menodora yecorana*. The Municipio of Yécora is rapidly being recognized as an important center of endemism.

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We are grateful to Gayle Turner for the Latin diagnosis, and to her and Ted Delevoryas for reviewing the manuscript. Ana Lilia Reina Guerrero provided the specimens and helped in the field.

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BEHNIACEAE (MAGNOLIOPHYTA), A NEW FAMILY OF ASTELIALES
(LILIOPSIDA)

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ABSTRACT

A new family of flowering plants, **Behniaceae**, is proposed for a single genus of South Africa plants, *Behnia*, belonging to the monocotyledonous order Asteliales. The family is most closely related to Geitonoplesiaceae, Luzuriagaceae, and Philesiaceae, and may be distinguished by an urceolate, sympetalous corolla, 2-3 ovules per locule, and woody stems with alternating cladophylls.

KEY WORDS: *Behnia*, Behniaceae, Magnoliophyta, Liliopsida, new family

The first to propose recognition of a small family for the South African genus *Behnia* Didrichs., was the late Rolf Dahlgren. The name was published initially by Gertrud Dahlgren (1989) as a *nomen nudum*. Currently, Dahlgren (1985), Takhtajan (1987, 1997) and Wielgorskaya (1994) place the genus in Luzuriagaceae, while Cronquist (1981, 1987), Gunn, *et al.* (1989), and Mabberley (1989) refer the genus to Smilacaceae. In 1992, Thorne considered the genus a taxon *incertae sedis*, but now wishes to recognize the family and has asked me to validate the name. While Thorne prefers to include the family in an expanded order Asparagales with Geitonoplesiaceae, Luzuriagaceae, and Philesiaceae, my own view is that these families are better placed in the order Asteliales next to a more narrowly defined Asparagales.

Behniaceae R. Dahlgren *ex* Reveal, *fam. nov.*

Luzuriagaceis affinis sed phyllocladodiis, florum tubo urecolato, ovarique loculis 2-3 ovulatis diversea. - Plantae perennes; caule cladodiis sessilibus instructo. Flores laxe subcymoso-racemosi vel cymosis, pedicello gracilibi secus bracteato elevati. Perianthium viridi-flavescens, ureceolatum breviter lobatum, tubo late cylindrico ad orem contracto; stamina 6, tubo medio affixa, perianthio breviora; ovarium basi in gynophoram crassam contractum, 3-

loculare , loculo unoquoque 2-3 ovulato. Semina subglobosa. - Genus unicum monotypicum: *Behnia* Didrichs.

ACKNOWLEDGMENTS

I wish to thank Rupert C. Barneby for his review of the manuscript and the Latin diagnosis and description., and Robert F. Thorne for his comments.

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NEW SPECIES OF *VERNONIA* (S.L.), SECTION *LEIBOLDIA*,
(ASTERACEAE, VERNONIEAE), FROM EASTERNMOST OAXACA, MEXICO

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ABSTRACT

A new species, *Vernonia wendtiana* B.L. Turner, is described and illustrated from easternmost Oaxaca (Mpio. Chimalapa), México. It belongs to the section *Leiboldia* and is obviously closely related to *Vernonia salvinae*, a species of easternmost Chiapas, México and Central America. It differs from the latter in possessing smaller heads with (4-)6-seriate closely appressed, markedly gradate, involucre bracts.

KEY WORDS: Asteraceae, Vernonieae, *Vernonia*, *Leiboldia*, México, Oaxaca

Preparation of a treatment of the tribe Vernonieae for the Comps of Mexico (Turner, in prep.) has occasioned the present paper.

VERNONIA WENDTIANA B.L. Turner, *spec. nov.* Figure 1. TYPE: MEXICO. Oaxaca: Mpio. Sta. Maria Chimalapa, Sierra de Tres Picos, central part, N side, along ridge (between branches of Arroyo Garrobo) that rises southward toward the main E-W ridge and Cerro Picotzue, ca. 16.5 straight-line km SSE of La Laguna, Ver. (17° 07' 50" N, 94° 27' 55" W), steep ridge exposed to wind, with irregular cloud forest 10-15 m high of *Quercus skinneri*, diverse Lauraceae, etc., 1000-1100 m, 3 Apr 1996, T. Wendt, et al. 6745 (HOLOTYPE. MEXU!; Isotype: TEX!).

Similis *V. salvinae* Hemsl. sed capitulscientiae capitula parviora et plura habent, et bractae involucrorum 4-6 seriatas, valde gradatas et expressas sunt.

"Weak semi-candelabriform small tree to 3 m high" with trunks to 12 cm across. Stems densely hirsute. Larger leaves 12-16 cm long, 3.5-6.0 cm wide; petioles 1.0-2.5 cm long; blades decidedly elliptical, widest at or near the middle, pinnately veined, appressed pubescent above and below, lower surfaces decidedly glandular-punctate,

the margins denticulate. Heads mostly arranged 2-3 in terminal cymes, these overtopped by the leaves, the ultimate peduncles 1-2 cm long, pubescent like the stems. Involucres broadly campanulate, 1.2-1.5 cm high, 1.2-1.8 cm wide (pressed); bracts 4-6 seriate, gradate, the innermost linear-lanceolate with mostly broadly rounded thickened erose apices that are not reflexed with age. Receptacles plane, epaleate, ca. 5 mm across, glabrous. Florets numerous; corollas pink, ca. 15 mm long, sparsely glandular pubescent throughout; tubes ca. 8 mm long, grading into the throat, the lobes linear-lanceolate, 2-4 mm long. Achenes obpyramidal, ca. 3.5 mm high, smooth and glabrous; pappus of numerous tawny, readily deciduous, barbellate bristles 6-9 mm long.

Vernonia wendtiana belongs to the sect. *Leiboldia* of *Vernonia* (s.l.) as treated by Turner (1981), although Gleason (1929) and Robinson & Funk (1988) recognized the latter as generically distinct. It is clearly closely related to *V. salvinae*, but differs from the latter in having smaller, more numerous heads, the involucral bracts 4-6 seriate, strongly gradate, with rather thick unreflexed apical appendages.

It is a pleasure to name this novelty for Thomas Wendt, well-known field worker in the Chimalapan forests and curator at TEX.

ACKNOWLEDGMENTS

I am grateful to Gayle Turner for the Latin diagnosis, and to her and Justin Williams for reviewing the paper.

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Turner, B.L. 1981. New species and combinations in sections *Leiboldia* and *Lepidonia* (Asteraceae), with a revisional conspectus of the groups. Brittonia 33:401-412.

**SABAZIA BREEDLOVEI (ASTERACEAE, HELIANTHEAE), A NEW SPECIES
FROM GUERRERO, MEXICO**

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ABSTRACT

A new species of *Sabazia*, *S. breedlovei* B.L. Turner, from Guerrero, México, is described and illustrated. It is known only by a single collection and reportedly occurs along stream sides in pine-oak forests at ca. 2000 m. The taxon is believed to be closely related to *S. macdonaldii* of Oaxaca, but is readily distinguished from the latter by its subscapose habit and achenes which possess a pappus of ca. 20 persistent lanceolate scales 3-5 mm long (vs. pappus absent).

KEY WORDS: Asteraceae, Heliantheae, *Sabazia*, México, Guerrero, systematics

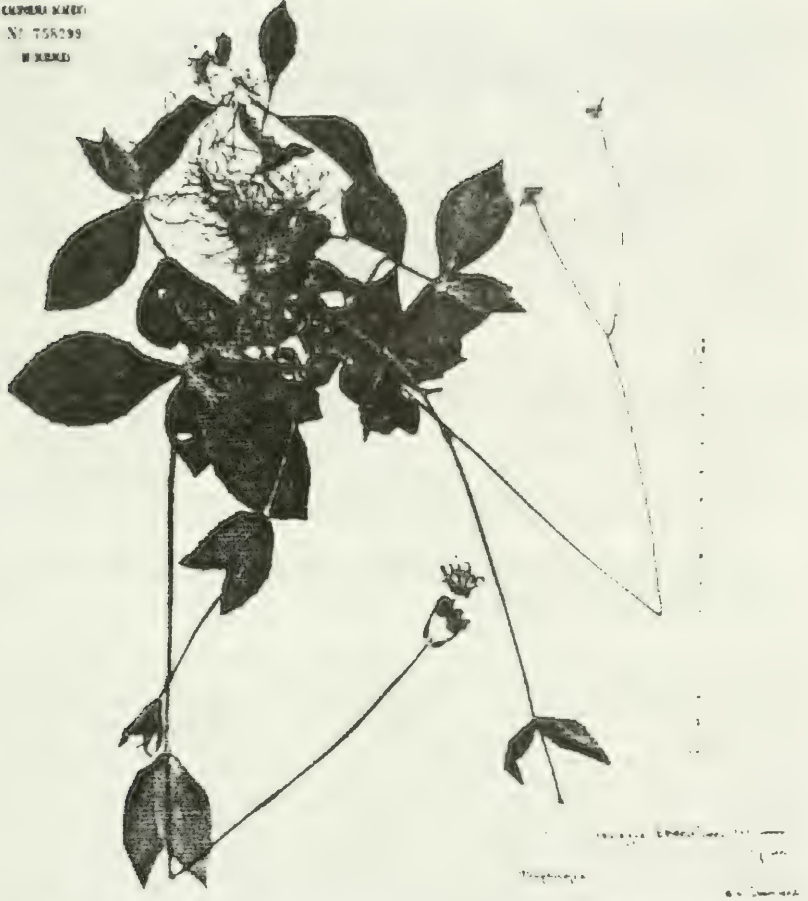
Routine identification of Mexican Asteraceae has revealed the following novelty.

SABAZIA BREEDLOVEI B.L. Turner, *spec. nov.* TYPE: MEXICO. Guerrero: "Slope with *Pinus* and *Quercus* along stream 35.5 km NW of Filo de Caballo along road to Atoyac," 1980 m, 11 Oct 1986, D.E. Breedlove & F. Almeda 65204 (HOLOTYPE: CAS!).

Similis *S. macdonaldii* B.L. Turner sed subscaposa est et achenia cum pappo persistenti squamarum 2-3 mm longarum habet (vice achenia epapposa habendi).

Perennial erect herbs to 40 cm high, the stems arising from a pronounced fibrous root system. Midstems sparsely to densely hirsute with white hairs 2-3 mm long. Leaves mostly basal or subbasal, the rather naked scapes bearing only 1 or 2 pairs of reduced leaves, the lateral leafy off-shoots from the crown of the roots presumably layering (*i.e.*, rooting at the nodes), the larger basal leaves 6-7 cm long, 3-4 cm wide, sessile or nearly so; blades elliptic to elliptic-obovate, widest at or above the middle, 3-nervate from 3-8 mm above the base, moderately hirsute above and below, the

CAPITULA RARE
Nº 758299
W. TURNER



PLANTS OF GUERRERO, MEXICO

Flowers white.
Slope with pine and oaks and
steep 37.5 km NW of Toluca, Caxtle
along road to Atlixco.
Elevation 1500 m.

L.T. Breedlove (holotype)
J. Allen
11 October 1966

Figure 1. *Sabazia breedlovei*, holotype.

margins minutely denticulate. Heads 2-3, borne on nearly naked scapes ca. 38 cm high (the scapes with 1-2 pairs of reduced leaves), the ultimate tomentose peduncles (in fruit) 5-8 cm long. Involucres broadly campanulate, ca. 7.5 mm high, 10 mm across; bracts 3-seriate, imbricate, the outer series ovate, hispidulous, ca. 5 mm high, 3 mm wide, the inner series broadly lanceolate, ca. 7 mm long, 6-8 nervate, moderately pubescent. Receptacle broadly conical, ca. 2.5 mm high, 3.5 mm across; pales only weakly persistent, lanceolate, 5-6 mm long. Ray florets 8, pistillate, fertile; tubes ca. 2.5 mm long, densely pubescent with silky hairs; ligules ca. 10 mm long, white or rosy white (drying), the apices with 2-3 irregular teeth 1-3 mm long. Achenes (immature) of ray and disk florets similar, ca. 2.5 mm long, obpyramidal, minutely striate, moderately pubescent throughout with ascending hairs, the carpodium asymmetrical; pappus of ca. 20 markedly persistent narrowly lanceolate scales 2-5 mm long.

As indicated in the diagnosis, this taxon is closely related to *Sabazia macdonaldii* but can be distinguished by its subscapose habit and markedly pappose achenes. It is named for Dennis Breedlove, well-known Mexican botanist working out of CAS.

ACKNOWLEDGMENTS

I am grateful to Gayle Turner for the Latin diagnosis, and to her and Justin Williams for reviewing the paper.

TAXONOMIC ADJUSTMENTS IN NORTH AMERICAN *ASTER* SENSU
LATISSIMO (ASTERACEAE: ASTEREEAE)

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ABSTRACT

Taxonomic adjustments and comments on differences in treatment are made and noted for species and species groups of North American *Aster* in the broadest sense, based on recent literature and observations. The following new combinations are made in *Symphytotrichum*: *S. eatonii* (A. Gray) Nesom, *comb. nov.*, *S. praealtum* var. *nebraskense* (Britton) Nesom, *comb. nov.*, and *S. kralii* Nesom, *nom. nov.* (for *Aster pinifolius* Alex.).

KEY WORDS: *Symphytotrichum*, *Aster*, Astereae, Asteraceae, nomenclature

Since the appearance of a morphologically based review of *Aster* L. s. lat. and proposal of a system of segregate genera for the American species (Nesom 1994), several recent publications have treated groups of these species. Xiang & Semple (1996) presented the results of their molecular analysis (restriction site variation in *cpDNA*) of North American *Aster*. Semple *et al.* (1996) have provided a detailed floristic guide to the Ontario asters, including those they retained in *Aster* s. str. and those of several genera recognized outside of *Aster* (*Doellingeria* Nees, *Oclemena* Greene, and *Diplactis* Rafin.), and Labrecque & Brouillet (1996) have provided clarifications in the definitions and nomenclature of a group of species recognized as *Symphytotrichum* Nees sect. *Symphytotrichum* in my treatment (see further comments below). Taxonomic modifications and comments based on these sources and other recent observations, as they affect the system proposed in Nesom (1994), are summarized in the present paper.

The North American species group retained as *Aster* by Semple *et al.* (1996) is equivalent to the group of genera comprising the "Eurybian lineage" of Nesom (1994), with three (or four) exceptions: (1) they exclude the northwestern North American genus *Oreostemma* Greene (also treated as a valid genus by Nesom 1994); (2) they exclude the western North American species *Aster integrifolius* Nutt., which I treated within the genus *Eurybia* (Cass.) S.F. Gray as the monotypic sect. *Integrifoliae* Nesom (Nesom 1994); and (3) they apparently exclude the monotypic genus *Herrickia*

Woot. & Standl. of New Mexico and Colorado (included within *Eurybia* by Nesom [1994], see notes below). The genus *Psilactis* A. Gray was mentioned by Semple *et al.* (p. 2) as one of the groups included in *Symphyotrichum* s. lat. (sensu Semple & Xiang), but it was omitted in the list of synonyms of *Aster* s. str. in North America (1996, p. 26), even though other non-Ontario taxa were included in the list.

The decision by Semple *et al.* to maintain the largest groups of North American species within *Aster* is based on the phylogenetic arrangement of species from the cpDNA study by Xiang & Semple (1996) and on pragmatic grounds (see comments below).

Xiang & Semple (1996) found the generic type of *Aster*, *A. amellus* L., to be phyletically imbedded within the species group recently recognized as *Eurybia* sect. *Eurybia* (Nesom 1994). *Aster amellus* was placed in a position widely separate from the only other Old World species in the Xiang & Semple analysis, *A. alpinus* L., which Semple (in Semple *et al.* 1996) transferred to the Rafinesquian genus *Diplactis* (see comments below). Based on my survey of morphology and cytology of Old and New World species, I conclude that the evolutionary development of Old World *Aster* has been independent from the New World *Eurybia* and "Eurybian lineage." The primarily Eurasian but nearly circumboreal *A. alpinus* is the American species most closely related to *Aster* sect. *Aster*, which I regard as strictly an Old World group. The phylogenetic position of *A. amellus* needs further investigation.

The groups treated as *Eurybia* and *Sericocarpus* Nees in Nesom (1994) show in the Xiang & Semple analysis to be sister groups and distinct from the remainder of the Eurybian lineage (= the large genus *Symphyotrichum* and its "satellites"). Semple (in Semple *et al.* 1996, p. vii) outlined the pattern of his decision regarding "whether or not to retain the *Symphyotrichum* group of genera (including *Virgulus*) in the redefined *Aster* or to recognize one or more of these as separate genera." "Because many, perhaps most, users of [the Ontario] guide may be reluctant to adopt the new nomenclature, [he] finally decided to retain the entire *Symphyotrichum* group in *Aster*" but noted that he believes that further "research will strengthen the case for breaking up *Aster* even more than is done here."

I have only a few strong disagreements with the broad topologic outlines of the two cpDNA cladograms from Xiang & Semple summarized in Semple *et al.* (1996). Morphology indicates that *Sericocarpus* plus *Eurybia* form the sister group to *Symphyotrichum* and a group of smaller genera related to it, and this apparently is confirmed by the molecular data of Xiang & Semple. The most serious conflict in my view is that *Aster amellus* should be positioned next to *A. alpinus*, near the bottom of the arrangement, rather than amidst the species of sect. *Eurybia*. Other species in the Xiang & Semple analysis needing further investigation of their phylogenetic position are noted below (*Eurybia glauca* [Nutt.] Nesom; *Oclemena reticulata* [Pursh] Nesom).

Symphyotrichum: taxonomic modifications and observations.

* *Symphyotrichum ciliolatum* (Lindl.) Löve & Löve includes *S. subgeminatum* (Fern.) Nesom (Hay *et al.* 1990; Labrecque & Brouillet 1996) simply as part of the

normally variable species. Neither are other infra-specific taxa recognized with *S. ciliolatum* (Brouillet 1981).

* *Symphyotrichum cordifolium* (L.) Nesom is treated as a variable species without formally recognized varieties. *Symphyotrichum sagittifolium* (Wedem. ex Willd.) Nesom s. str. is regarded as a synonym of *S. cordifolium* (see Semple *et al.* 1996), although Jones (1989, 1990) has retained an entity by this name at varietal level within *S. cordifolium*, suggesting that it may have acquired its distinction through hybridization with other species. Jones (1990) also has a different idea regarding the identity of the *S. sagittifolium* type. Research, clarifications, and a better consensus are obviously needed in this complex.

* *Symphyotrichum drummondii* (Lindl.) Nesom var. *texanum* (Burgess) Nesom is observed to include *S. drummondii* var. *parviceps* (Shinners) Nesom.

* *Symphyotrichum dumosum* (L.) Nesom var. *dodgei* (Fern.) Nesom is observed to be either a growth form of *S. dumosum* var. *strictior* (Torr. & Gray) Nesom or else a hybrid, *S. dumosum* × *S. boreale* (Torr. & Gray) Löve & Löve (see Semple *et al.* 1996). It is tentatively accounted for here as a synonym of *S. dumosum* var. *strictior*.

* *Aster eatonii* (A. Gray) Howell is taken as the correct name (in *Aster*) for what I previously treated as *Symphyotrichum bracteolatum* (Nutt.) Nesom. Cronquist (1990; 1994) regarded the type specimen of *A. bracteolatus* Nutt. as morphologically intermediate between *Aster eatonii* and *A. hallii* A. Gray, noting (1990, p. 129) that "Conceivably the specimen reflects hybridization between the two species it most resembles." Following Cronquist's suggestion (p. 129), "the name [*A. bracteolatus*] should remain in limbo as a nomen dubium."

Symphyotrichum eatonii (A. Gray) Nesom, *comb. nov.* BASIONYM: *Aster foliaceus* var. *eatonii* A. Gray, *Synopt. Fl.* 2(1):194. 1884. *Aster eatonii* (A. Gray) T.J. Howell, *Fl. N.W. Amer.* 310. 1900.

* *Symphyotrichum eulae* (Shinners) Nesom is a distinct and stable species endemic to north-central Texas, not to be indicated as a hybrid (Nesom in prep.).

* *Symphyotrichum firmum* Nees (Nesom) is treated as a synonym of *S. puniceum* (L.) Nesom var. *puniceum* (Labrecque & Brouillet 1996).

* *Symphyotrichum novi-belgii* (L.) Nesom. The observations and suggestions of Labrecque & Brouillet (1996) and Brouillet & Labrecque (1997) are followed here.

Symphytotrichum novi-belgii var. *tardiflorum* (L.) Nesom (= *Aster tardiflorus* L. s. str.) is observed to be a hybrid (*S. puniceum* × *S. cordifolium*) that should not be treated as a synonym or variety of *S. novi-belgii*.

Symphytotrichum novi-belgii var. *litoreum* (A. Gray) Nesom is treated as a synonym of *S. praealtum* (Poir.) Nesom var. *praealtum*.

Symphytotrichum crenifolium (Fern.) Nesom is treated as a variety of *S. novi-belgii*.

Aster novi-belgii var. *villicaulis* (A. Gray) Boivin is treated as a variety of *Symphytotrichum novi-belgii*. This taxon and its equivalent, *A. johannensis* Fern., were previously regarded as synonyms of *S. anticostense* (Fern.) Nesom.

Symphytotrichum longifolium (Lam.) Nesom s. str. is considered a synonym of *S. novi-belgii* var. *novi-belgii*. The entity referred to as "*Aster* <<longifolius>>" by Labrecque & Brouillet and by most earlier authors, is instead *Aster robysianus* Rousseau (see Semple *et al.* 1996, following a communication from Luc Brouillet). New combinations required to instate this nomenclature in *Symphytotrichum* are made by Brouillet & Labrecque (1997).

* *Symphytotrichum ontarione* (Wieg.) Nesom includes a varietal entity from Ontario and Québec formally described in Semple *et al.* (1996). The nomenclatural combination in *Symphytotrichum* was made by Brouillet & Labrecque (1997).

* *Aster pinifolius* Alexander is recognized as a distinct species endemic to Florida, following the observations of Kral (1983). It is formally instated within *Symphytotrichum* by the following, recognizing the botanist who sharpened our awareness of its distinction.

Symphytotrichum kralii Nesom, *nom. nov.* BASIONYM: *Aster pinifolius* Alexander in Small, *nom. illeg.*, *Man. Southeastern Fl.* 1387, 1509. 1933. Not *Aster pinifolius* Nees, *Synops. Aster.* 29. 1818.; not *Aster pinifolius* F. Muell., *Fragm. Phytogr. Austr.* 5:71. 1866.

* *Symphytotrichum praealtum* (Poir.) Nesom. As noted by Jones (1992, p. 33), "The plants are variable, but varieties that have been recognized cannot readily be delimited because of a high degree of morphological intergradation and an apparent lack of convincing geographic range separation." At least there seems to be no justification for maintaining var. *texicola* (Wieg.) Nesom, which should be treated as a synonym of var. *praealtum*. On the other hand, Jones (1980) has proposed that the Texas plants now identified as *S. praealtum* be called *A. coerulescens* DC. instead, observing that this population system may be of hybrid origin between *S. praealtum* and *S. lanceolatum* (Willd.) Nesom. Shinnars (1949), in contrast, had no hesitation in equating the type of *A. coerulescens* and the Texas plants similar to it with *S. praealtum*. Semple *et al.* (1996) note that *S. praealtum* var. *angustior* (Wieg.) Nesom is an octoploid race native to the northeastern United States. The status of var. *subasperum* (Lindl.) Nesom remains questionable. To accommodate existing treatments, var. *nebraskense*, a conspicuously hairy entity within the species near the

western edge of its range, needs to be recognized (e.g., Cronquist 1980), although its distinction from var. *subasperum* needs to be clarified.

Symphytotrichum praealtum (Poir.) Nesom var. *nebraskense* (Britton) Nesom, *comb. nov.* BASIONYM: *Aster praealtus* var. *nebraskensis* Britton in Britton & Brown, *Illus. Fl.* 3:375. 1898.

* *Symphytotrichum puniceum* (L.) Nesom var. *calderi* (Boivin) Nesom (= *Aster calderi* Boivin) is treated without formal status within *S. puniceum*. These small plants near the northern extreme of the species' range in Québec apparently are reduced in size in response to cold and a short growing season (Brouillet, pers. comm.). With the downgraded rank of var. *calderi*, *S. puniceum* is now regarded as a variable species with only two formally recognized varieties. The rare *S. puniceum* var. *scabriculae* (Shinners) Nesom occurs on the Gulf Coastal Plain from Mississippi to Texas (Nesom in ms.).

* *Aster schistosus* Steele has been recognized from Virginia as a shale barren endemic. It has been considered a synonym of the more widespread *Symphytotrichum lowrieianum* (Porter) Nesom (e.g., Fernald 1950), as both taxa may have originated as hybrids between *S. cordifolium* and *S. laeve* (L.) Löve & Löve, but a distinction can be made between the two (e.g., Gleason & Cronquist 1991; and see Jones 1980 for broader comments on *S. lowrieianum*).

* *Symphytotrichum spathulatum* (Lindl.) Nesom. Cronquist's assessment (1994) has been followed in adopting this as the name for the species commonly known as *Aster occidentalis* (Nutt.) Torr. & Gray. *Symphytotrichum spathulatum* var. *fremontii* (Torr. & Gray) Nesom is added here to the synonyms of var. *spathulatum*.

* Labrecque & Brouillet (1996) have pointed out a serious problem in the typification of *Symphytotrichum*. The genotype, from the original description by Nees, is *S. unctuosum* Nees. Relying on earlier students of the genus (including J. Lindley, A. Gray, A. Cronquist, and A. Jones), but without having seen the type, I took this name as a synonym of *A. tardiflorus*, which in turn has been regarded as conspecific with *A. novi-belgii*. Labrecque & Brouillet, however, observe that the type of *A. tardiflorus* former appears to be a hybrid between *S. puniceum* (sect. *Symphytotrichum*) and *S. cordifolium* (sect. *Cordifolii*). Gray (in Torrey & Gray 1841) first observed that *S. unctuosum* was conspecific with *A. tardiflorus* but later (1884) noted that it was equivalent to *A. novi-belgii* var. *litoreus* A. Gray, which Labrecque & Brouillet observe to be a synonym of *S. praealtum* (sect. *Dumosi*). Thus, depending on a critical examination of the type specimen for *S. unctuosum*, it is possible that the genotype might be assigned to any of three sections within subg. *Symphytotrichum*, as tentatively structured in Nesom (1994). Whatever the resolution may be, it will not affect the nomenclature of any of the species of *Symphytotrichum*.

Jones (1980, p. 258) presented a different view on the identity of the *Aster tardiflorus* type and its relationship to *A. novi-belgii*, observing that the two taxa "intergrade extensive and can often be distinguished only with difficulty." More recently (e.g., 1987), she has treated *A. tardiflorus* as a variety of *A. novi-belgii*.

Miscellaneous observations.

* *Eurybia* sect. *Herrickia*. In changing the rank of the genus *Herrickia* to a section within *Eurybia*, I inexplicably substituted "Torr. & Gray" as the authority for the name at sectional rank. The nomenclatural statement should have been *Eurybia* sect. *Herrickia* (Woot. & Standl.) Nesom, *comb. nov.*, based on *Herrickia* Woot. & Standl., Contr. U.S. Natl. Herb. 16:186. 1913.

* *Eurybia glauca* (Nutt.) Nesom (= *Aster glaucodes* S.F. Blake) is positioned in the cpDNA analysis of Xiang & Semple (1996) within the genus *Eucephalus* Nutt. Several achenial and capitular features of *Eurybia glauca* are unusual compared to other species of *Eurybia* (Nesom 1994), but I conclude that it is most closely related to species placed in *Eurybia* sect. *Herrickia*. The morphology of *Eurybia glauca* does not support its placement in *Eucephalus*.

* *Aster chasei* G.N. Jones, according to Semple *et al.* (1996, p. 30), is among the six "Biotian" species recognized by studies of Lamboy and colleagues (*e.g.*, Lamboy *et al.* 1991). New information or a new interpretation may be involved in this observation, but I have regarded *A. chasei* as a synonym of *Eurybia schreberi* (Nees) Nees, based on the accounting by Lamboy & Jones (1987).

* *Aster integrifolius* Nutt. was positioned within *Eurybia* as the monotypic sect. *Integrifoliae* Nesom and described as "seemingly isolated within the genus" (Nesom 1994, p. 193). It may prove to be separate from *Eurybia*, as suggested by the analysis of Xiang & Semple (1996), but at least we are agreed that it does not belong within *Aster* s. str.

* *Oclemena reticulata* (Pursh) Nesom is positioned in the cpDNA analysis of Xiang & Semple (1996) among the species of *Doellingeria*, where it also was treated by Semple, *et al.* (1991). The morphology of this species, however, appears unequivocal in allying it with the other taxa accepted by Semple *et al.* (1996) within *Oclemena*. I do not find that *O. reticulata* "has fruit traits that are intermediate between those of *Doellingeria umbellata* [(Mill.) Nees] and *Oclemena acuminata* [(Michx.) Greene]," as implied by Semple *et al.* (1996, p. 24).

* *Almutaster* (*Aster*) *pauciflorus* (Nutt.) Löve & Löve is consistently positioned by the Xiang & Semple analysis within the upper branches of *Symphyotrichum* (sensu Nesom 1994) as a close relative of *S. tenuifolium* (L.) Nesom of sect. *Oxytripolium*. Students of the genus have noted evidence for such a relationship (see review in Nesom 1994), but I maintained *A. pauciflorus* as the monotypic genus *Almutaster* Löve & Löve on the basis of its distinctive morphology and its close similarity to *Psilactis* (which was not sampled by Xiang & Semple).

* Recognition of *Diplotaxis* as a genus may prove to be desirable, but *cpDNA* data from only two Old World species provide weak justification for the decision to transfer species to that taxon. Details of Old World species groups were discussed in Nesom (1994) and it was noted that a number of them appear to be isolated. That survey indicates Old World species are phyletically separate from autochthonous New World ones but that "there is no firm evidence or explicit hypothesis that Old World *Aster* is monophyletic" (Nesom 1994, p. 150).

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A NEW VARIETY OF *PRUNUS RIVULARIS* (ROSACEAE) FOR TEXAS

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ABSTRACT

Recent collections from the central Edwards Plateau reveal a pubescent variety of *Prunus rivularis* Scheele, here described as *Prunus rivularis* var. *pubescens* var. nov. *Prunus murrayana* Palmer, heretofore considered an uncommon Trans-Pecos Texas endemic, is placed in synonymy with the new variety.

KEY WORDS: Rosaceae, *Prunus rivularis*, *Prunus murrayana*, Texas, systematics, nomenclature

DISCUSSION

From the time of the author's first collection of the new variety, in Edwards County on March 22, 1997, it was apparent that it was merely a pubescent variety of *Prunus rivularis* Scheele. It was also apparent that the pubescent variety, here described as *Prunus rivularis* var. *pubescens* Enquist, was probably identical to *Prunus murrayana* Palmer (1929) and warranted further study. Further search revealed the pubescent variety of *P. rivularis* in Edwards, Crockett, Sutton, Schleicher, Concho, Tom Green, Irion, Coke, and Sterling counties (Figures 1 and 2). The search also revealed plants very similar to the new taxon in Scurry, Taylor, Nolan, and Callahan counties, but these are here excluded for various reasons. The population in Nolan county is on the same site as a dilapidated farmhouse and has fruit approximately twice the usual size, creating the possibility that it may have been selected for fruit size from another population of indeterminate locality and transplanted to Nolan County. The populations in Scurry and Taylor counties have essentially eglandular calyx lobes and may be introgressed with *Prunus gracilis* Engelm. & A. Gray. The Callahan County collection was made in late summer, the timing precluding examination of the flowers for signs of introgression with *P. gracilis*, which is common in the vicinity.

Prunus murrayana has been considered a localized endemic largely confined to the igneous soils of the Davis Mountains of Jeff Davis County in West Texas, but with a few outliers on limestone soils in the Glass and Del Norte Mountains of Brewster County (Powell 1988; Simpson 1988; Vines 1976; Correll & Johnston 1970). The

known populations of *P. murrayana*, all west of the Pecos River, have never been known to set fruit (Simpson 1988; Vines 1976; Correll & Johnston 1970), and seemingly reproduce only vegetatively, by root suckers. The recently discovered populations of the pubescent variety of *P. rivularis* are all east of the Pecos River and all set fruit in the spring and summer of 1997. In one case, on Highway 864 in the southeast corner of Schleicher County, the fruit-set was prolific, with many hundreds, if not thousands, of ripe plums in a single colony. The differences in the fruiting abilities of the Davis Mountains populations and the central Edwards Plateau populations are probably due to the fact that the Davis Mountains receive little to no rainfall in early spring. The bulk of the rainfall in the Davis Mountains comes in July and August, with the remainder of the year being dry (pers. comm. with Mike Powell, SRSC). Obviously, this rain cycle provides moisture too late for flowering and fruit-set in the *P. murrayana* populations. The central Edwards Plateau, on the other hand, usually receives sufficient rainfall from February to April to ensure successful flowering and fruit-set of its plum populations.

When Palmer (1929) described *Prunus murrayana*, he commented: "Although I have not seen the fruit, this species is so distinct in the character of its inflorescence and in the pubescence from any other Plums with which I am acquainted that I venture to describe it as new. It is perhaps most closely related to *Prunus rivularis* Scheele, which it resembles in habit of growth, but from which it is well distinguished by the characters mentioned in the above description."

The apparent differences between *Prunus rivularis* and *P. murrayana* result from descriptions that, like the blind men describing the elephant, describe only limited aspects of the entities' characters. For example, the leaves of *P. rivularis* have been described as conduplicate (Correll & Johnston 1970), but this character is not mentioned in Palmer's description of *P. murrayana*. The discrepancy might lead some to conclude that *P. murrayana* does not have conduplicate leaves. The reality is that both taxa produce strongly conduplicate leaves on the new shoots of that year's growth, particularly when they are exposed to full sun. But when the leaves grow in partial or full shade, both taxa produce a more flattened leaf blade. Similarly, the young branchlets of *P. murrayana* are described as greenish-brown (Palmer 1928) while the young branchlets of *P. rivularis* have been described as chestnut-brown (Correll & Johnston 1970). Once again, the descriptions seem to indicate a difference, but the reality is that both taxa produce both types of coloration, with first-year branchlets exposed to full sunlight being reddish-brown and branchlets in the shade being a light greenish-brown. The petioles of both taxa show similar variation in color according to exposure to the sun. Other apparent differences result from minor oversights. Palmer described the petioles of *P. murrayana* as eglandular, which could be construed as a character providing a distinction from *P. rivularis*. However, the only collection with mature leaves mentioned in the type description of *P. murrayana* (Palmer 34562), has leaves with petioles that range from eglandular to glandular, with the latter showing one or two prominent glands near the apex.

After the descriptions of *Prunus murrayana* and *P. rivularis* are brought into parallel, the remaining differentiating characters are essentially one character: pubescence. *Prunus murrayana* has (1) pubescent pedicels, (2) pubescence around the full circumference of the petioles and (3) pubescence on the epidermis of first year branches, sometimes retained to a lesser degree into the second year. These are the

same characters which distinguish the new variety of *P. rivularis* (Figure 3). Palmer was correct in noting that this taxon "... is perhaps most closely related to *P. rivularis* Scheele." The present author believes *P. murrayana* is probably identical to the new variety of *P. rivularis*, but chooses to give the variety a new, more descriptive name. Because *P. murrayana* is imperfectly typified (no fruit seen or described) there is a possibility that *P. murrayana* could one day be resurrected if it does produce fruit and they are distinctive. In that case, the pubescent variety of *P. rivularis* would no longer have a name. The new name negates that possibility.

Both varieties of *Prunus rivularis* are thicket formers that expand the size of the colony by root suckers. It is not possible to distinguish between the varieties based on general appearance at a distance. It is necessary to approach closely and examine the branchlets for pubescence. Both varieties prefer creekside habitats and dry washes, but also do well on fencelines well away from creeks. Colony size is highly variable, ranging from as little as 2 meters by 2 meters, up to 5 meters by 40 meters along rights-of-way.

The fruit of both varieties of *Prunus rivularis* are cherry red and white-dotted, with a bloom varying from light to heavy. The fruit are almost orbicular, usually being slightly longer than wide. Fruit size in both varieties ranges from 13 mm long by 12 mm wide to 18 mm long by 18 mm wide. The fruits of *P. rivularis* var. *rivularis* are usually described as being quite bitter. However, this reputation is due to the fact that the fruits of var. *rivularis* are prone to fall from the tree when they are red, but not fully ripe. The red (but unripe) fruits are quickly eaten by nocturnal mammals, leaving only a gnawed pit in the morning. This sequence of events has apparently prevented botanists from obtaining truly ripe fruit. If the red fruit are taken from the tree and set aside for a few days to a week, they develop a deep red to purple color and become soft, at which time their flesh is sweet and edible, or, at the least, a good deal less bitter and unpalatable. The same is true of the fruit of var. *pubescens*. It is likely that the indigenous tribes of Texas were aware of this and took advantage of the fact. Although it is certainly possible that the Davis Mountains populations are relictual, it is also within the realm of possibility that those populations are in their present location as a result of human transport.

PRUNUS RIVULARIS Scheele, Linnaea, 21:594. 1848. TYPE: U.S.A. Texas: *F. Lindheimer* (No collection number, date or locality given). Wight (1915), comparing the Lindheimer specimens at MO with the information from Lindheimer cited by Scheele, states that *Lindheimer* 274 at MO (Texas: Comal Co., New Braunfels, 1846 [not seen]) is "apparently a duplicate of the type."

The following description of *Prunus rivularis* var. *rivularis* is partially based on material from central Texas (including the area of the type locality). A more general description of *P. rivularis* var. *rivularis* (as *P. rivularis*) can be found in Vines (1976), but it is considered useful in the present case to compare populations of the two varieties from the same region.



Figure 1. Documented ranges of *Prunus rivularis* var. *rivularis* (solid dots) and *P. rivularis* var. *pubescens* (circles) in Texas.

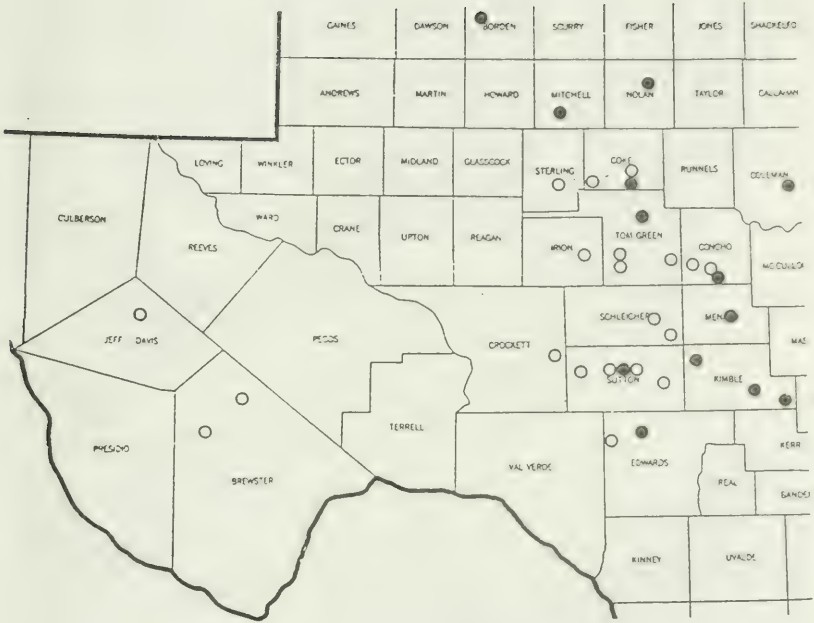


Figure 2. Detail of ranges of *Prunus rivularis* var. *rivularis* (solid dots) and *P. rivularis* var. *pubescens* (circles).



Figure 3. Detail of leaves and inflorescence of *Prunus rivularis* var. *pubescens* (from Enquist 3379).

PRUNUS RIVULARIS Scheele var. *RIVULARIS*

Shrub 1-4(-5) m tall, forming dense thickets; bark gray; first-year branchlets glabrous, pale green to reddish-brown; stipules linear, 3-6 mm long, glandular to glandular serrate, sometimes 2- to 3-parted; leaves lanceolate to ovate-lanceolate, 5-8 (-9) cm long, 2-3(-4) cm wide, acuminate to acute at apex, cuneate or rounded at base, margin glandular-serrate, 8-11(-12) teeth/cm, leaves in full sun strongly conduplicate, leaves in shade flattened, green and glabrous above, paler beneath and slightly pubescent (sometimes densely so while young); petioles 8-12 mm long, usually with 2-4 glands at apex, pale green to reddish-brown, usually pubescent only in trough on upper surface; flowers 1 to 4, 8-12 mm across; pedicels slender, glabrous or very sparsely pubescent, 7-12 mm long; calyx sparingly pubescent outside; calyx lobes oblong to ovate-oblong, glandular-ciliate, shorter than tube, pubescent within (especially near base), erect or spreading to finally reflexed; petals obovate to oblong-obovate, 5-8 mm long, short-clawed; fruit globose to subglobose, 13-18 mm long, usually red, rarely yellow; stone oblong to subglobose, 8-12 mm long, smooth or slightly reticulate (description based on collections depicted as solid dots in Figures 1 and 2).

Along creeks, dry washes, roadsides, breaks in slopes, from the Edwards Plateau and north-central Texas to the base of the panhandle, fruiting June-August; also in Oklahoma and Kansas (Vines 1976; Stephens 1973).

Specimens examined:

U.S.A. Texas: Bandera Co.: 18 mi W of Medina on Medina River at Samuel Sutton Ranch, 13 Mar 1949, *D.L. Jameson* 48-480 (TEX). Bexar Co.: San Antonio, 7 Mar 1962, *L.J. Bottimer* Z3 (TEX). Borden Co.: Caprock breaks, 2.97 mi N of int. 180 & 1054, 5 Apr 1997, *M. Enquist* 3411 (BRIT, GH, MO, TAES, TEX, US). Burnet Co.: Ravine 3 mi N of Burnet, to 3 m high, 6 Jun 1945, *R. McVaugh* 7099 (TEX). Coleman Co.: US 84 at Santa Anna, 19 Mar 1966, *S. Dieckmeier* 4 (TEX). Comal Co.: Comanche Spring, New Braunfels, Jul 1851, *F. Lindheimer* 790 (TEX); 5 1/2 mi SE of Fischer's Store, 27 Mar 1948, *V.L. Cory* 54036 (TEX). Concho Co.: Bluffs along Concho River at Paint Rock, 29 Jun 1946, *D.S. Correll & H.B. Correll* 12926 (TEX); Eden, 0.7 mi S on 83 from int. of 87 & 83, 30 Mar 1997, *M. Enquist* 3407 (BRIT, GH, MO, TAES, TEX, US). Coryell Co.: 6 mi E of Gatesville, 4 Apr 1966, *S. Jackson* 22 (TEX). Dallas Co.: Stults Prairie, SW corner of Coit Road and Belt Line Road, 28 May 1959, *D.S. Correll & I.M. Johnston* 22450 (TEX). Edwards Co.: Upper Nueces River, 11 Sep 1929, *B.C. Tharp* 44371 (TEX). Ellis Co.: 4.5 mi S of Ferris, W of US 75, 17 May 1945, *R. McVaugh* 6913 (TEX). Floyd Co.: Along White River, 7 mi S of Floydada, 10 Jul 1946, *D.S. Correll* 13118 (TEX). Gillespie Co.: Near Fredricksburg, Sep 1985, *J. Lipe* s.n. (TEX). Grayson Co.: Sherman, Sherman Lake, 15 Jun 1939, *B.C. Tharp* 44375 (TEX). Hill Co.: 7 mi NE of Hillsboro on limestone ledges, 2 Apr 1957, *D.S. Correll & C. Schweinfurth* 15499 (TEX). Jack Co.: Ft. Richardson State Park, Park Road 61 at low-water crossing, 6 Jul 1993, *W.R. Carr* 12869 (TEX). Kendall Co.: 3 2/3 mi E of Sisterdale, 24 Jul 1944, *V.L. Cory* 45258 (TEX). Kerr Co.: 13.5 mi NE of Kerrville on Hwy 16, 2 Apr 1974, *J. Smith* 6 (TEX). Kimble Co.: 12 mi NW of Harper, Coffey Ranch on White Oak Creek, 13 May 1947, *R. McVaugh* 8305 (TEX); 15 mi W of Junction, near Bois d' Arc, 10 ft tall, 1 Apr 1947, *H.R. Reed* 6 (TEX). Lampasas Co.: Mt. View School, 12 Jun 1941, *Game, Fish and Oyster*

Commissioner 1009 (TEX). Llano Co.: Enchanted Rock, 10 Jun 1930, *B.C. Tharp & E. Whitehouse s.n.* (TEX). Menard Co.: Below summit of plateau 1 mi S of Menard, 3 m high, 12 May 1947, *R. McVaugh 8284* (TEX). Mitchell Co.: On 163, 1.4 mi S of int. 163 & 2183, 5 Apr 1997, *M. Enquist 3409* (BRIT,GH,MO,TAES,TEX,UVST). San Saba Co.: Leonard Ranch 10 mi S of Richland Springs, 26 Mar 1966, *K. Calhoun 5* (TEX). Sutton Co.: S side of Sonora, 1.9 mi E of int. 277 & 479, 23 Mar 1997, *M. Enquist 3373* (BRIT,GH,MO,TAES,TEX,NY). Tom Green Co.: Red Creek crossing of Hwy 277, 15 Apr 1951, *J.C. Johnston 615* (TEX). Travis Co.: N side of Slaughter Creek in Searight Park, 7 Jul 1992, *W.R. Carr w/ Paul Turner 12117* (TEX).

PRUNUS RIVULARIS Scheele var. **PUBESCENS** Enquist, var. nov. TYPE: U.S.A. Texas: Edwards County, Hwy. 277, 5.2 miles south of intersection of 277 and 55, east side of road, north of roadcut, 23 Mar 1997, *Marshall F. Enquist 3379* (HOLOTYPE: TEX; Isotypes: ANSM,BRIT,GH,MO,OKL,SRSC,TAES,US.)

Prunus murrayana Palmer, J. Arnold Arbor. 10:38. 1929. TYPE: U.S.A. Texas: Jeff Davis County, Near head of Big Aguja Canyon, 21 Apr 1928, *E.J. Palmer 33424* (HOLOTYPE: GH!; Isotype: GH!).

Pruno rivulari Scheele typico similis sed differt petiolis ramulis juvenibus et pedicellis corymborum pubescentibus.

Shrub 1-4(-5) m tall, forming dense thickets; bark gray; *branchlets densely pubescent the first season, becoming gray and glabrous or retaining some of the pubescence the second season*, first year branchlets pale green to reddish brown; stipules linear, 3-6 mm long, glandular-serrate, sometimes 2- to 3-parted; leaves lanceolate to ovate-lanceolate, 4-7(-8) cm long, 15-28 mm wide, acute or acuminate at apex, cuneate to rounded at the base, margin glandular serrate, 8-10(-11) teeth/cm, leaves in full sun strongly conduplicate, leaves in shade more flattened, green and slightly pubescent above, paler and pilose-pubescent beneath; petioles 8-15(-19) mm long, glandless or with 1-3 glands at apex, pale green to reddish-brown, *densely pubescent*; flowers 1 to 4, 8-12 mm across; *pedicels slender, sparingly to densely pubescent*, 8-12 mm long; calyx sparingly to densely pubescent outside, the oblong-lanceolate lobes obtuse, pubescent within and often densely hispid-pubescent on the outer surface; petals obovate, 5-8 mm long, short-clawed; fruit globose to subglobose, 13-18 mm long, red, stone elongate and pointed at both ends to subglobose, 8-12 mm long, smooth to slightly reticulate.

Along creeks, dry washes, roadsides, and breaks in slope, from central Edwards Plateau west to Davis Mountains, fruiting June-August.

Specimens examined:

U.S.A. Texas: Brewster Co.: Narrow canyon 9 mi SE of Alpine, 12 Mar 1992, *A.M. Powell & S.A. Powell 5814* (SRSC); In canyon on E side of Mt. Ord, Del Norte Mountains, 7 Apr 1947, *L.C. Hinckley & George Brown 3813* (SRSC); Jailhouse Canyon on Iron Mountain Ranch in Glass Mountains, both sides of creekbed in limestone, 22 Mar 1994, *P. Manning 728* (SRSC); Limestone canyon on E side of Mt. Ord, Del Norte Mountains, Gage Estate, 14 Jul 1947, *B. Warnock 6427*

(SRSC); 10 mi SE of Alpine, canyon E of Mt. Ord, on sandstone talus, 23 May 1949, *R. McVaugh 10613* (TEX); Canyon E of Mt. Ord, 7 Apr 1947, *R. McVaugh 7873* (GH). Coke Co.: Hwy. 208, N of San Angelo, about 150 yards N of Tom Green/Coke line, W side of road, 5 Apr 1997, *M. Enquist 3419* (BRIT,GH,MO,SRSC,TAES,TEX); Hwy. 208, 2.5 mi N of Tom Green/Coke line, E side of road at culvert, 5 Apr 1997, *M. Enquist 3417* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,UVST); Highway 87, SW corner of Coke Co., NW of San Angelo at crossing of Hwy. 87 over Walnut Creek, 30 yards over fence, E side, 5 Apr 1997, *M. Enquist 3408* (ANSM,BRIT,GH,MO,NMC,SRSC,TAES,TEX,US). Concho Co.: On 87, 8.8 mi W of int. of 83 and 87 in Eden, 30 Mar 1997, *M. Enquist 3405* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,US), 4 Jul 1997, *M. Enquist 3503* (BRIT,TAES,TEX); Hwy. 87, 1.6 mi W of int. of 83 and 87 in Eden, S side of road, 40 yards over fence, 30 Mar 1997, *M. Enquist 3406* (BH,COLO,F,HPC,KANU,LSU,NCU,RM,SHST,SWT,UC,UTEP), 4 Jul 1997, *M. Enquist 3502* (BH,COLO,F,HPC,KANU,LSU,NCU,RM,SHST,SWT,UC,UTEP). Crockett Co.: Off access road along I-10, 2.3 mi W of Crockett/Sutton line, N side of road, 23 Mar 1997, *M. Enquist 3376* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,US), 29 Mar 1997, *M. Enquist 3392* (BH,COLO,F,KANU,LSU,NCU,RM,SWT,UC,UTEP,UVST), 20 Jun 1997, *M. Enquist 3492* (ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,UVST). Edwards Co.: 22.4 mi N of Loma Alta on Hwy. 277 or 5.2 mi S of int. 277 & 55, E side of road, just N of long roadcut, 22 Mar 1997, *M. Enquist 3362* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,US), 23 Mar 1997, *M. Enquist 3379* (ANSM,BRIT,GH,MO,OKL,SRSC,TAES,TEX,US), 18 Jun 1997, *M. Enquist 3490* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,UVST), 28 Jun 1997, *M. Enquist 3501* (COLO,F,KANU,LSU,NCU,RM,SWT,UC,UTEP). Irion Co.: Mertzon, on Hwy. 67, 0.7 mi N of int. of 67 & 2469, at bridge, W side in ravine, 30 Mar 1997, *M. Enquist 3403* (ANSM,BRIT,GH,MEXU,NMC,OKL,SRSC,TAES,TEX,US,UVST). Jeff Davis Co.: Near Buffalo Trails Scout Camp, in Million Dollar Canyon, 2 May 1987, *J. Larke L-609* (SRSC); Upper reaches of Limpia Canyon, Wild Rose Pass, Davis Mountains, *B. Warnock 6427* (SRSC); Buffalo Trails Scout Camp, at end of Highway 1832, in Little Aguja Canyon, 28 Jun 1997, *M. Enquist 3500* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,OKL,TAES,TEX,US,UVST); Along dry rocky bed and banks of ravine, in canyon, near Ft. Davis, 13 Jun 1928, *E.J. Palmer 34562* (GH); Rocky banks of ravine, near head of Big Aguja Canyon, Fowlkes' Ranch, Davis Mts., 21 Apr 1928, *E.J. Palmer 33424* (GH). Schleicher Co.: From int. of 864 & 1674 in Ft. McKavett, 3.4 mi SW on 864, E side of road on fenceline, 29 Mar 1997, *M. Enquist 3398* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,OKL,TAES,TEX,US), 27 Jun 1997, *M. Enquist 3498* (ANSM,ARIZ,BRIT,GH,MEXU,NMC,NY,OKL,TAES,TEX,US,UVST); From int. of 190 & 2084, 3.0 mi N on 2084, W side of road, 100 yards over fence under Live Oak tree line, 30 Mar 1997, *M. Enquist 3400* (BH,F,HPC,KANU,RM,SHST,SWT,UC,UTEP). Sterling Co.: Near Sterling City, creekside, location withheld to protect landowner, 19 Jul 1997, *M. Enquist 3525* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,OKL,TAES,TEX,US). Sutton Co.: On I-10, E of Sonora, 2.6 mi E of int. 467 & 864 (at exit 404), N side of I-10 on fenceline and extending 20 yards into ROW, 27 Jun 1997, *M. Enquist 3497* (BRIT,GH,MO,TAES,TEX,UVST); 34.1 mi W of int. of I-10 & 83 in Junction or 1.3 mi E of int. of I-10 & Baker Road on Hwy. 3130, 23 Mar 1997, *M. Enquist 3372* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,SRSC,TAES,TEX,US), 28 Mar 1997, *M. Enquist 3385* (BH,F,HPC,KANU,RM,SHST,SWT,UTEP), 20 Jun 1997, *M. Enquist 3495* (ANSM,ARIZ,

BRIT,GH,MEXU,MO,OKL,NY,SRSC,TAES,TEX,UVST); From int. of 479 & 277 on the S side of Sonora, 0.6-0.7 mi E on 864, N side of road on corner, 23 Mar 1997, *M. Enquist 3375* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,TAES,TEX,US,UVST), 29 Mar 1997, *M. Enquist 3391* (BH,COLO,F,HPC,KANU,LSU,NCU,RM,SHST,SWT,UC,UTEP); From int. of 479 & 277 on the S side of Sonora, 3.2 miles E on 864, S side of road on fenceline, 23 Mar 1997, *M. Enquist 3374* (BRIT,GH,MO,NMC,OKL,NY,SRSC,TAES,TEX), 29 Mar 1997, *M. Enquist 3389* (BH,COLO,F,HPC,KANU,LSU,NCU,RM,SHST,SWT,UC,UTEP), 20 Jun 1997, *M. Enquist 3494* (BH,COLO,F,HPC,KANU,LSU,NCU,RM,SHST,SWT,UC,UTEP); From int. of I-10 & Caverns of Sonora Road, 8.0 mi S on Caverns of Sonora Road, in ravine 150-200 yards off road to E, on Valiant Ranch, 23 Mar 1997, *M. Enquist 3378* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,SRSC,TAES,TEX,UVST). Tom Green Co.: Christoval, from int. of N end of Loop 110 & 277, about 100 yards N on 277, E side on slope above road cut, 30 Mar 1997, *M. Enquist 3402* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,OKL,SRSC,TAES,TEX,US), 27 Jun 1997, *M. Enquist 3499* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,OKL,SRSC,TAES,TEX); Christoval, from int. of 277 & S end of Loop 110, 0.15 mi NE on Loop 100 to concrete bridge over dry wash, W side of bridge, 30 Mar 1997, *M. Enquist 3401* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,SRSC,TAES,TEX,US); On E side of county, 7.5 mi S on Ft. McKavett Road from int. of 87 & Ft. McKavett Road, W side of road on fenceline, 30 Mar 1997, *M. Enquist 3404* (ANSM,ARIZ,BRIT,GH,MEXU,MO,NMC,NY,OKL,SRSC,TAES,TEX).

EPILOGUE

The recent discovery of a widely dispersed population of this taxon distributed over a well-traveled and highly populated area illustrates the dangers inherent in poorly researched evaluations of the "rarity" of taxonomic entities. Extreme caution in such judgments is well advised and the following maxim should always be kept in mind -- Absence of evidence is not evidence of absence.

ACKNOWLEDGMENTS

I would like to thank Mike Powell for the loan of comparative material from the SRSC collection. I would also like to thank Chester Rowell for his assistance in obtaining permission to collect comparative material at the Buffalo Trails Scout Camp in the Davis Mountains. In the great tradition of West Texas hospitality, the personnel of the Buffalo Trails Scout Camp were gracious and cooperative hosts. They have my heartfelt appreciation.

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THE STATUS OF *ASTER SCABRICAULIS* (ASTERACEAE: ASTEREAE), AN
ENDEMIC OF THE GULF COASTAL PLAIN

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ABSTRACT

Aster scabricaulis is a rare entity of wet habitats on the Gulf Coastal Plain, now known from seven counties of northeastern Texas, one of northwestern Louisiana, and two of central Mississippi. These plants were originally described at specific rank but more recently have been treated as a variety of *A. puniceus*. The latter view is maintained here, as *A. scabricaulis* is weakly but consistently differentiated in morphology and set apart in geographic distribution from the main population system of *A. puniceus*, which has a more northern and montane distribution. Variation in *A. puniceus* is reviewed, and observations on morphology and habitat, specimen citations, and a distribution map are provided for var. *scabricaulis*. All taxa considered are members of the segregate genus *Symphyotrichum*, where the correct name for the coastal plain endemic is *S. puniceum* var. *scabricaule* (Shinners) Nesom.

KEY WORDS: *Aster scabricaulis*, *Aster puniceus*, *Aster elliottii*, *Symphyotrichum*, Astereae, Asteraceae, systematics

Aster scabricaulis Shinners was formally described (Shinners 1953) on the basis of collections from Smith County and Van Zandt County of northeastern Texas. In the original description, Shinners observed (p. 157) that "Future revision of the *A. puniceus* complex may reduce [*A. scabricaulis*] to varietal rank, but it appears about equally related to [*A. puniceus* L., *A. firmus* Nees, and *A. nebraskensis* (Britt.) Wieg. (= *A. praealtus* Poir. sensu lato)]." *Aster scabricaulis* was maintained at specific rank by Correll & Johnston (1970) but treated by Jones (1984, 1987) as a variety of *A. puniceus*. Its geographic range is considerably expanded with data summarized in the present report, but its rarity is little reduced. *Aster scabricaulis* is under consideration for listing as an endangered entity, with a current Nature Conservancy ranking of G5T2S2.

With assistance from the Texas Parks & Wildlife Department and the U.S. Fish & Wildlife Service, I studied native populations of *Aster puniceus* in North Carolina and

South Carolina, and *A. scabrimaculis* in Texas within a single week (23-28 October 1995), making direct comparisons of habitat and morphology, taking color photographs, and sampling population variability for laboratory study. In addition, I have studied specimens of both entities from over their geographic range.

Taxonomic background.

In a review of the systematics of *Aster* sensu lato (Nesom 1994), *A. scabrimaculis* was treated at varietal rank within *A. puniceus*. All nomenclature for these entities now belongs within the genus *Symphotrichum* Nees, consistent with the hypothesis that Old World asters (including the generic type of *Aster* L.) are phylogenetically independent from the New World species (Nesom 1994). Because of the historic components to the following discussion, however, previous names in *Aster* are used.

Jones's broadened concept of *Aster puniceus* (1984, 1987) not only included *A. scabrimaculis* but also two other taxa, each of which she recognized at both varietal and subspecific rank: *A. firmus* (including *A. lucidulus* [A. Gray] Wieg.) and *A. elliotii* Torrey & Gray. She treated *A. puniceus* var. *scabrimaculis* (Shinners) A.G. Jones within *A. puniceus* subsp. *elliotii*. In brief justification of her rearrangement, Jones (1984, p. 384) noted only that the "affinities [of var. *scabrimaculis*] clearly lie with *A. puniceus*. Characteristics of the leaves, rhizomes, and capitula relate the taxon to subsp. *elliotii*."

A similarity between *Aster elliotii* and *A. puniceus* was also observed by Radford *et al.* (1968), who suggested that the two might be combined as a single species. In formally combining the two, Jones (1984, p. 384) observed that "Although the extreme forms of this taxon can be distinguished from typical *A. puniceus*, there is complete intergradation in regions of sympatry, e.g., in Maryland, Virginia, and Tennessee." But while hybrids may be formed in Maryland and Virginia, the habitat of *A. elliotii* is restricted to the outer coastal plain and there is no other area of sympatry with *A. puniceus*. *Aster elliotii* does not occur in Tennessee (Wofford & Kral 1993). Both species occupy broad ranges. Cronquist (1980; Gleason & Cronquist 1991) maintained these two as separate species, and my examination of both entities leads to the same conclusion. The current study proceeds on the basis that *A. elliotii* is morphologically and geographically distinct from *A. puniceus* as well as its closest relatives (see key below for a summary of differences). There is no evidence to confirm Jones's mostly implied observation of greater similarity between *A. scabrimaculis* and *A. elliotii* than between *A. scabrimaculis* and *A. puniceus*.

Aster firmus has previously been treated within *A. puniceus* (e.g., Torrey & Gray 1841; Gray 1884; Semple *et al.* 1983; Jones 1989), sometimes at varietal rank. In contrast, Cronquist (1980, and in Gleason & Cronquist 1991) and Barkley (1986) have maintained *A. firmus* as a separate species (see key below for summary of differences). They were treated as separate species in my *Aster* review (Nesom 1994) but the more conservative view is more widely accepted in current treatments, as further considered in the discussion below.

Aster praealtus was included by Shinnars among the species he saw as most closely related to *A. scabricaulis*, but I have seen no evidence to indicate the involvement of *A. praealtus* with any aspect of variation in *A. scabricaulis*. The former is distinguished from *A. scabricaulis* by its reduced stem pubescence, narrow, entire leaves with slightly revolute margins and barely subclasping bases, venation of isodiametric areolae, the nearly cylindrical arrangement of heads at the branch tips, more constricted chlorophyllous zone of the phyllaries, and the abruptly ampliate disc corollas.

Distribution and habitat of *Aster scabricaulis*.

The localities known for *Aster scabricaulis* have increased in number since its original description, and the total extent of its geographic range in Texas has been broadened to seven closely associated northeastern Texas counties (Map 1; Specimens Examined). Known localities were revisited and new ones discovered in 1993, 1994, and 1995 by personnel of the Texas Natural Heritage Program. Their additional observations and detailed comments on habitat and present status and abundance of these plants are now on computerized records maintained as the Biological Conservation Database by the Texas Parks & Wildlife Department. The species also was the subject of a brief biological and taxonomic summary in a status report by Mahler (1984).

Aster scabricaulis is rare in Texas. At a number of its known localities, only one or a few plants exist. Even in the last five years, the number of individuals in all localities apparently has dropped markedly, even to the point of extirpation in several of them. This entity is rare in Mississippi and probably now extinct in Louisiana.

The range of *Aster scabricaulis* is significantly expanded by the confirmation of localities for it in Louisiana and Mississippi. The relatively early Louisiana collection by R.S. Cocks (made ca. 1910, *vide* A. Bradburn, the label data without the year of collection) was originally identified as *A. puniceus*, annotated as *Aster praealtus* by R. Pavlu in 1976, as "*A. cf. puniceus*" by A.G. Jones in 1980, and included in the Asteraceae of Louisiana as *A. puniceus* by Gandhi & Thomas (1989). It is likely that Cocks made this collection from one of the boggy habitats well-known in the Kisatchie area of Natchitoches Parish, but such a plant has not been located in recent intensive studies of these habitats and this region in general (MacRoberts 1988, 1990, 1991, and pers. comm.). The Cocks collection is the only representative of this species known from Louisiana.

The first Mississippi records of *Aster puniceus* (*A. scabricaulis*) were collected in 1978 and correctly identified by Sidney McDaniel from a low, wet area in Lauderdale County. Two other closely situated populations were discovered in 1986 and 1987 by Wayne Morris in springhead bogs of Grenada County (Morris 1988) and identified by Robert Kral.

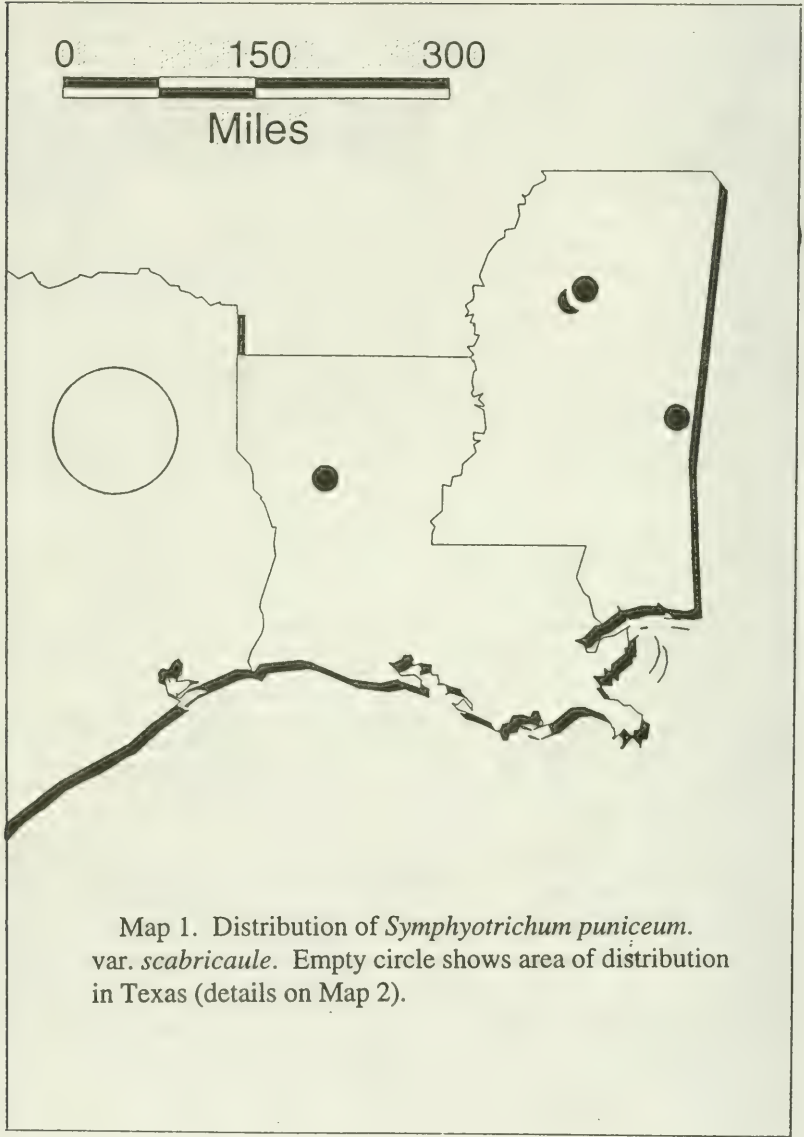
Plants of *Aster scabricaulis* are specialized and restricted in their natural habitat -- they grow in mucky, saturated soil in open sites at the edges of seepage areas, bogs, marshes, and small lakes or in drainage channels associated with these areas. All

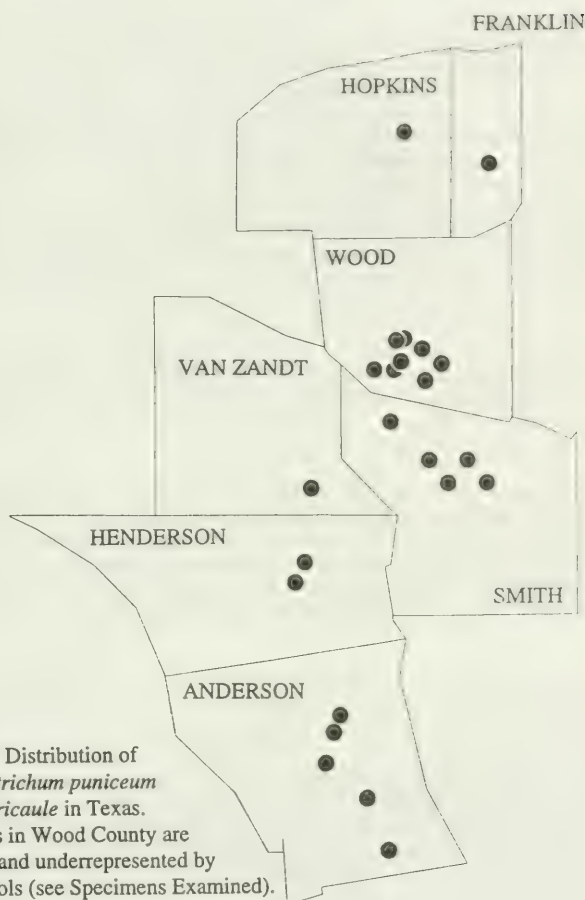
Texas sites for *A. scabricaulis* are within an area where the regional vegetation is developed on deep, loose sand derived from deposits of the middle Eocene Claiborne group, chiefly the Carrizo, Sparta, and Queen City formations.

The prevailing vegetation of the Texas region that includes these sites is primarily an oak woodland with scattered pine, sweetgum, and hickory. The dominant species are *Quercus falcata*, *Q. marilandica*, *Q. stellata*, *Q. velutina*, *Q. margaretta*, *Pinus taeda*, *Liquidambar styraciflua*, and *Carya texana*, with scattered *Quercus nigra* and *Nyssa sylvatica*. Common understory species are *Juniperus virginiana*, *Rhus copallina*, *Ulmus alata*, *Sassafras albidum*, *Cornus florida*, and *Acer rubrum*. At the wet sites with *A. scabricaulis*, common and closely associated woody species are *Cephalanthus occidentalis*, *Myrica cerifera*, *Baccharis halimifolia*, *Acer rubrum*, *Salix nigra*, *Alnus serrulata*, and *Betula nigra*. Common herbaceous species at these sites include *Polygonum sagittatum*, *Polygonum punctatum*, *Boehmeria cylindrica*, *Hydrocotyle verticillata*, *Ludwigia* spp., *Mikania scandens*, *Helianthus angustifolius*, *Bidens laevis*, *Aster lateriflorus*, *Solidago rugosa*, *Eupatorium perfoliatum*, *Conoclinium coelestinum*, *Woodwardia areolata*, *Thelypteris kunthii*, *Leersia lenticularis*, *Dichantheium dichotomum*, *Typha domingensis*, *Cyperus* spp., *Scirpus cyperinus*, *Fuirena pumila*, and other Cyperaceae. At sites that are more bog-like, species of *Eriocaulon*, *Xyris*, *Eryngium*, *Doellingeria*, and others also may be found (see Kral 1955).

Most of the known habitats in Texas for *Aster scabricaulis* have been strongly modified by human activity. Most of these sites are along roadway rights-of-way, either in artificially created habitats or in natural sites intersected by roads, where the hydrology has been altered. Kral (1955) studied the "Ben Wheeler site" in Van Zandt Co. and reported the existence of a large bog with dense and characteristic vegetation; this bog apparently is now converted to a small lake with almost no bog vegetation. In this region of Texas, however, habitats similar to those already known for *A. scabricaulis* are abundant (in drainage areas and around impoundments of small to moderate size, all or almost all of these on private property), and hopefully these plants may be situated in other such sites not yet investigated. It may be possible to persuade local land owners to begin populations of *A. scabricaulis* on their property, since it appears that these beautiful plants could be introduced and grown in a number of localities in the immediate area where they now occur but are rare.

Plants of *Aster scabricaulis* have been grown to reproductive maturity both in pots and in normally moist gardens at the Mercer Arboretum in Humble, Texas (Greg Wieland, pers. comm.), which is surprising in view of the apparent restriction of these plants to saturated soil in their natural habitats. Plants have been grown from achenes although the germination percentage appears to be relatively low, and cuttings also are easily propagated and grown to maturity. Further study of germination characteristics and seedling ecology should facilitate the re-establishment of *A. scabricaulis* into habitats within its native region.





Distribution and habitat of *Aster puniceus*.

Aster puniceus occurs from Labrador to Newfoundland and Maine westward to Ontario, southern Manitoba, Saskatchewan, and Alberta, and to Wisconsin, Minnesota, and North Dakota. From New England, it occurs south to Virginia and westward through West Virginia, Indiana, and northern Illinois, with outlying populations in Missouri, Iowa, and Nebraska. *Aster puniceus* reaches the southern limit of its main range in the Appalachian region of North Carolina, South Carolina, Tennessee, and northern Alabama and extends with less abundance into the adjacent piedmont of Georgia and the Carolinas. As suggested by Semple *et al.* (1983) for the origin of outlying western populations of var. *puniceus*, the Gulf Coast populations recognized here as var. *scabricaulis* may also be "glacial relicts" separated from the main range of the species during the Pleistocene. The distribution of the species is summarized in an outline map in Semple *et al.* (1983).

Localities for *Aster puniceus* in coastal parishes of southeastern and south-central Louisiana shown by Gandhi & Thomas (1989) are instead for *A. elliottii* at the western limit of its range (vouchers NLU!) but in typical habitats for that species. The record shown by Gandhi & Thomas for *A. puniceus* in northwestern Louisiana is for *A. puniceus* var. *scabricaulis*, as identified here.

Aster puniceus grows in open, wet habitats: swamp margins, marshes, alluvial woods, bogs, ditches, in seepage at the base of steep banks, and on river, stream, and lake banks. In northwestern North Carolina, the species is particularly common in ditches and other drainages associated with the development of roads and agriculture. These habitats occur within various types of regional vegetation, from oak-hickory woodlands to communities characteristic of higher Appalachians.

Variation in *Aster puniceus*.

Fernald (1950, p. 1428) noted that *Aster puniceus* is "one of our most intricately variable and wide-ranging species" and formally recognized five varieties within the range of his floristic treatment. He furnished keys to varieties and forms of the species in northeastern North America (Fernald 1899, 1950). Scoggin (1979), Strausbaugh & Core (1978), Seymour (1982), and others also have formally recognized a series of varieties and forms within *A. puniceus*, which Scoggin referred to as an "aggregate species." Taxa that have been recognized at varietal rank within *A. puniceus* are listed below (with general type localities).

- A. puniceus* var. *albiflorus* Farwell (Michigan);
- A. puniceus* var. *calderi* (Boivin) Lepage (Québec);
- A. puniceus* var. *calvus* Shinnars (West Virginia);
- A. puniceus* var. *colbyi* Benke (Wisconsin);
- A. puniceus* var. *compactus* Fern. (Massachusetts);
- A. puniceus* var. *demissus* Lindley (eastern North America);
- A. puniceus* var. *firmus* (Nees) Torrey & Gray (eastern North America);
- A. puniceus* var. *laevicaulis* A. Gray (eastern North America);

A. puniceus var. *lucidulus* A. Gray (Wisconsin)
A. puniceus var. *monocephalus* Farwell (Michigan);
A. puniceus var. *oligocephalus* Fern. (Labrador);
A. puniceus var. *perlongus* Fern. (Québec);
A. puniceus var. *puniceus* (eastern North America);
A. puniceus var. *purpureus* Pursh (eastern North America);
A. puniceus var. *rufescens* Pursh (eastern North America);
A. puniceus var. *scabricaulis* (Shinners) A.G. Jones (Texas);
A. puniceus var. *vimineus* Torrey & Gray (eastern North America).

Variable characters by which these entities have been recognized (as taken from the original descriptions and published keys) are primarily the following: cauline vestiture densely and uniformly hispid, hispid in lines, strongly reduced, or of loose, soft hairs; leaves subrhomboidal or greatly elongate; leaf surfaces hispid to glabrous, dull to shiny; leaf margins entire to serrate; capitulescence narrow or relatively broad, compact or open, with branches longer or shorter than the subtending bracteal leaves; bracteal leaves closely or widely spaced; heads numerous or few to solitary; peduncles to 6 mm long or mostly shorter; outer phyllaries 1 mm broad or up to 3 mm broad, sometimes foliaceous; disc corollas red or purple vs. yellow; and ray corollas blue, white, or reddish.

Shinners (1943, p. 348) observed that "Some of the named varieties [of *Aster puniceus*] are probably to be referred to hybrids with *A. foliaceus* or other species, others are hardly more than forms of the species itself." A number of these varieties have been formally reduced in rank to forms (e.g., Shinners 1941; Fernald 1949), but for the most part these entities have come to be accepted within the normal range of variability for *A. puniceus* and not accorded formal taxonomic recognition. Only var. *scabricaulis* among these is accepted here as a morpho-geographic variant formally recognized within the species.

Aster puniceus var. *firmus* (= *Aster firmus*) has been among the taxonomically most persistent varieties of *A. puniceus*, and only this variety was considered in cytological reviews of *A. puniceus* by Semple *et al.* (1983, 1992). Shinners (1941, p. 414) noted that "Wiegand is apparently correct in maintaining *Aster lucidulus* [= *A. firmus*] as a species distinct from *A. puniceus*, but it is not always very easy to distinguish the two. Characters of the internodes, leaves, pubescence, panicles, heads, and style branches are sufficiently inconstant to make it impossible to rely upon any of them." He later observed that *A. firmus* is "readily distinguishable from *A. puniceus* in the field by its habit of forming large beds from creeping rootstocks . . .; by its densely leafy stem; and by its dense inflorescence" (Shinners 1945, p. 71). The *A. firmus* morphotype occurs in habitats similar to those of typical *A. puniceus* and the two taxa overlap in geographic range over a broad area, with *A. firmus* reported to occur from Québec south to West Virginia and North Carolina and westward to Iowa, Minnesota, and North Dakota.

When they are regarded as separate taxa, *Aster puniceus* and *A. firmus* are reported to intergrade (e.g., Barkley 1986; Mohlenbrock 1986; Jones 1989). Jones (1980b) provided a detailed comparison of these two taxa with the observation that they are strongly separated species, but she later (1984, 1987, 1989) took the view that intergradation with *A. puniceus* made varietal status for *A. firmus* more appropriate. Semple *et al.* (1983, p. 1434) observed that "There is a great range of

variation [in *A. puniceus*] in stem pubescence, floret color, leaf color, and rhizome morphology. . . . We could find no non-arbitrary way to separate collections on the basis of [these features]." Steyermark (1963) and Fisher (1988) reached generally the same conclusion for *A. puniceus* in Missouri and Ohio, respectively, and Labrecque & Brouillet (1996) have agreed.

Plants of *Aster puniceus* in the southern Appalachians and adjacent piedmont are more uniform in morphology, with but few populations showing features of *A. firmus*. One example is the type of *A. conduplicatus* Burgess (from Buncombe Co., N.C.), which has upper stem vestiture reduced to hairs in lines and a somewhat congested capitulescence suggestive of *A. firmus*.

Comparison of *Aster scabricaulis* and *Aster puniceus*.

Brief descriptions of *Aster scabricaulis* have been published by Shinnars (1953) and Correll & Johnston (1970); a full technical description is furnished below.

Shinnars (1953) observed similarities in *Aster scabricaulis* with both *A. puniceus* and *A. firmus*. *Aster scabricaulis* resembles typical *A. puniceus* in many features, including cauline vestiture and its production of short thick rhizomes, features that have been used to distinguish the latter from the *A. firmus* morphotype. Plants of *A. scabricaulis*, like *A. puniceus*, are perennials producing short rhizomes, the stems arising singly or in close clusters, mostly 4-8 feet tall (*A. puniceus* grows up to 9 feet tall), producing numerous branches above the middle and often bearing hundreds of heads. Stems of older plants are purple, commonly with secondary growth, and up to 15 mm thick at the base. The stem vestiture below the inflorescence usually is hispid-villous, of relatively thick hairs 0.5-1.2 mm long, and densely and uniformly distributed around the stem. In some plants of *A. scabricaulis* from Wood County (Nixon 13969; Nesom A95-10; Poole 4280) and Smith County (Poole 4281, 4282), the upper stem vestiture is strongly reduced in density with the hairs in lines, similar to the *A. firmus* morphotype. Also similar to *A. firmus*, there is a tendency in *A. scabricaulis* for the capitulescence to be noticeably condensed with heads on relatively short peduncles and for the leaves of the capitulescence (bracteal leaves) to be more numerous and reduced in size compared to the lower cauline leaves. In the original description of *A. scabricaulis*, Shinnars was not specific about its putative intermediacy between *A. puniceus* and *A. firmus*, but his description of the heads of *A. scabricaulis* as "rather numerous and crowded" matches his characterization of *A. lucidulus* (= *A. firmus*), with "short upper internodes [and] a dense and compact inflorescence."

Aster scabricaulis can be separated from *A. puniceus* (including *A. firmus*) over all of its range by features of its cauline and bracteal leaves (see key below). The morphological features that characterize *A. scabricaulis* are not unique to it within *A. puniceus*, especially if *A. firmus* is included, but the combination is consistent within *A. scabricaulis* and it contrasts with the morphology of var. *puniceus* from the Appalachian area of the eastern U.S. In the plants from Mississippi and Louisiana, the lower leaf surfaces are green but there is a slight darkening of the veiny reticulum, and the upper surfaces do not have distinctly impressed veins. The upper cauline and

bracteal leaves, however, are conspicuously reduced in size, and these plants are more like the Texas ones than those of typical var. *puniceus*. Plants of the coastal plain (var. *scabricaulis*), with warmer temperatures and a longer growing season, might also be inferred to be physiologically differentiated from those of the main range of *A. puniceus*. *Aster scabricaulis* is treated here at varietal rank as a morpho-geographic variant within *A. puniceus*, emphasizing its overall similarity but recognizing its segregation in geography and geological substrate and relatively slight though consistent morphological differences.

The following key summarizes the main differences among the taxa of concern in the present study.

1. Leaf bases tapered to a non-clasping base, or sometimes subclasping but never auriculate; rays pinkish, or mostly bluish in South Carolina southward and westward; swamp and marsh edges of the outer coastal plain, Virginia to Florida, then west to south-central Louisiana..... *A. elliottii*
1. Leaf bases auriculate-clasping; rays bluish or purplish, rarely white or slightly pink; wet meadows, bogs, marshes, and low woods of inner continent -- mountains, piedmont, inner coastal plain, rare on outer coastal plain. (2)
 2. Stems nearly glabrous or glabrescent in the lower half, hirsute or sparsely hispidulous in lines in the upper portion; lower leaf surface glabrous or sparsely scabrous along the midrib; leaves of the inflorescence conspicuously crowded; phyllary apices short-attenuate or often acute to obtuse; rhizomes long, stoloniform..... *A. firmus* morphotype
 2. Stems hispidulous over the entire length, the indument usually distributed uniformly around the stem but sometimes less dense and in lines; lower leaf surface glabrous to minutely strigillose or hispidulous, the midrib hispidulous or densely hirsute to villous; leaves of the inflorescence not conspicuously crowded; phyllary apices generally long-attenuate; rhizomes short, thick and fleshy..... *A. puniceus* (3)
3. Lower leaf surface distinctly lighter colored than the upper surface, with a distinct reticulum of dark colored veins; main veins of upper leaf surface not impressed; leaves of the capitulescence variable but mostly nearly equal in size to those lower on the stems..... *A. puniceus* var. *puniceus*
3. Lower leaf surface about the same color as the upper surface, without a strongly evident reticulum of dark colored veins; main veins of upper leaf surface shallowly but distinctly impressed, imparting a slightly rugose appearance; leaves of the capitulescence usually more numerous and distinctly reduced in size compared to the lower. *A. puniceus* var. *scabricaulis*

Chromosome numbers.

The chromosome number of var. *scabricaulis* has been reported as $2n=16$ (Smith County, TX; Jones 1984). Chromosome numbers of $2n=16$ (diploid) and $2n=32$ (tetraploid) have been reported for populations of var. *puniceus* (Jones 1980b; Semple 1985; Semple *et al.* 1983 and references therein; Semple *et al.* 1989; Semple *et al.* 1992; Semple *et al.* 1993; Semple *et al.* 1996). As documented in the studies by Semple and colleagues, diploids occur over the entire range of *A. puniceus*; the

tetraploids are uncommon and found only along the western margin of the range, in Illinois, Iowa, Wisconsin, Minnesota, and a few in northwestern Ontario. "No relationship between ploidy level and any particular morphotype has been demonstrated" (Semple *et al.* 1996, p. 74). The *Aster firmus* morphotype has been reported as diploid and tetraploid (Jones 1980b).

Aster puniceus var. *scabrimaculis* hybrids.

Putative hybrids between var. *scabrimaculis* and *A. lateriflorus* have been collected in east Texas. *Aster puniceus* \times *A. lateriflorus* hybrids have also been reported by Semple *et al.* (1996). Although the parentage apparently is similar, the putative Texas hybrids are somewhat different from each other in morphology.

* Var. *scabrimaculis* \times *A. lateriflorus* (Henderson County: Poole 4285).

This plant is most like var. *scabrimaculis* in characters of habit, capitulescence, and involucre but differs from it primarily in the following ways: the phyllaries are graduated in length and the apices broader; the stem pubescence is of relatively fine, crisped hairs; the basal auriculation of the leaves is not so pronounced; the ray corollas are pale blue rather than dark blue; and the entire limb of the disc corollas is purple, abruptly widened at the tube/throat junction, and the corolla lobes are about half the length of the limb. The only other aster present at this locality was *A. lateriflorus* (Poole 4284 [SHST]). The habit and overall morphology of Poole 4285 is little suggestive of *A. lateriflorus*, but the distinctive disc corolla morphology, particularly, of the putative hybrid and the proximity of the putative parents suggests that a contribution of genes from this species was involved.

* Var. *scabrimaculis* \times *A. lateriflorus* (Anderson County: Nesom A95-2, A95-5).

Var. *scabrimaculis* and *Aster lateriflorus* were the only two asters present at this locality. Nesom A95-1 is typical var. *scabrimaculis*. Nesom A95-2 has considerably smaller heads without elongated outer phyllaries and they are arranged nearly cylindrically at the stem apices, the disc corollas are shorter (3.5-4.0 mm long) with longer lobes, and the leaves are barely subclasping at base. Nesom A95-5 is a plant more nearly typical of *A. lateriflorus*, especially in involucre and floral features, but the largest cauline leaves are broad and firm (nearly identical to those of Nesom A95-2) and the stems have relatively short flowering portions, suggestive of genetic influence from var. *scabrimaculis*.

Technical description: *Symphyotrichum puniceum* var. *scabrimacule*.

Aster scabrimaculis Shinnery, Field & Lab. 21:156. 1953. (BASIONYM). TYPE: UNITED STATES. Texas: Smith County, 16 mi NW of Tyler [courthouse], 19

Oct 1947, *L.H. Shinnery 9504* (HOLOTYPE: SMU!). *Aster puniceus* L. var. *scabrimaculis* (Shinnery) A.G. Jones, *Phytologia* 55:384. 1984. *Symphotrichum puniceum* (L.) Nesom var. *scabrimacule* (Shinnery) Nesom, *Phytologia* 77:290. 1994.

Perennial herbs from short, thick rhizomes. Stems arising singly or in close clusters, mostly 4-8 feet tall, producing numerous branches above the middle, those of the older plants purple, woody, and up to 15 mm thick at the base, cauline vestiture usually hispid-villous, of relatively thick hairs 0.5-1.2 mm long, densely and uniformly distributed around the stem, the upper cauline vestiture reduced and in lines in some Wood County populations. Leaves chiefly cauline, lanceolate to lance-oblong or oblanceolate, petiolate, and auriculate-clasping, (3.5-)10-13 dm long, minutely and evenly scabrous above and beneath or the vestiture relatively reduced beneath, the margins often narrowly revolute, serrate with strongly antrorse, indurate-tipped teeth. Capitulescence relatively condensed as corymbiform clusters of heads near the branch tips, a large plant often bearing hundreds of heads, the heads on relatively short peduncles, bracteal leaves 10-25 mm long, these similar in shape and margin to those lower on the stems but distinctly more closely arranged and markedly reduced in size. Heads 6-10 mm broad; involucre bracts sparsely and minutely puberulent and ciliate to glabrous, linear, in 4-5 series of subequal length, the inner 6-8 mm long with the apical green portion ca. 1/4 the length of the phyllary and extending into a linear-subulate apex, the outer slightly shorter and often loose to strongly divergent or recurving, with the apical green portion 1/2-2/3 the phyllary length; receptacles shallowly membranous-foveolate. Ray flowers 20-34, the corollas 10-12 mm long, the tube ca. 2 mm long, the ligules blue, 1.0-1.6 mm wide, strongly coiling at maturity. Disc corollas yellowish, 4.0-5.5 mm long, narrowly funnelliform to nearly cylindric, the tube 1.8-2.0 mm long, very slightly widened into the limb, the lobes erect to spreading, 0.6-1.1 mm long, purplish at maturity; collecting appendages of the style branches narrowly triangular, 0.3-0.5 mm long, hairy, ca. 30-40% of the style branch length. Achenes 2.1-3.0 mm long, narrowly oblong-oblanceolate, flattened, 4(-5) nerved (with a nerve on each edge and 1[-2] on each face), tan or commonly purplish at maturity, glabrous to sparsely short-strigose; pappus bristles 35-48 in a single series, about as long as the disc corollas.

Specimens examined: *Symphotrichum puniceum* var. *scabrimacule*.

Louisiana. [NATCHITOCHES PARISH]: "pine woods," Natchitoches, Oct [1910], *R.S. Cocks s.n.* (NO--photocopies NLU, SHST).

Mississippi. GRENADA COUNTY: locally common in sphagnum bog, ["ca. 2.5 mi NNW of Gore Springs, in a boggy springhead"], T22N R6E W 1/2 Sec. 12, with *Cacalia lanceolata*, *Eryngium integrifolium*, *Oxypolis rigidior*, *Solidago patula*, *Habenaria clavellata*, *Habenaria ciliaris*, *Gentiana saponaria*, *Chelone glabra*, 7 Oct 1986, *Morris 2679* (NLU; others at SWSL, VDB, *fide* C. Bryson); ca. 4 mi SE of Gore Springs, T21N, R7E, S4, NE4, North Central Plateau, in a sphagnum springhead bog, forming fairly large colonies, 9 Oct 1987, *Morris 3061* (IBE-2 sheets, base and capitulescence). LAUDERDALE COUNTY: Hwy 11, 5 mi N Clarke Co. line, ca. 1 mi N Savoy, NW4, S9, low open area with *Salix nigra* [wet

area between highway and RR], locally common, 14 Oct 1978, *McDaniel 22172* (IBE-2 sheets).

Texas. ANDERSON COUNTY: Gus Engeling Wildlife Management Area, NW of Palestine, boggy area SE of Lake 2, 16 Oct 1993, *Dubrule 1348* (TAMU); Texas State Railroad Historical Park, 10 mi E of Palestine [between Rusk and Palestine, off Hwy 84], between mileposts 22 and 23, closer to 22 (1.0 mi E of jct of RR and Co. Rd. 386), open marsh with dense emergent vegetation crossed by railroad, 23 Oct 1975, *Lodwick 383* (BRIT); ca. 1 mi E of Slocum on Texas Hwy 294, drainage area from small pond, 20 Oct 1983, *Nixon & Ward 12658* (ASTC,SHST,BRIT); 3.2-3.3 mi NNW of jct Hwys 3309 and 315 on W side of Hwy 315, near jct with Co. Rd. 358, natural marsh area mostly covered with *Typha*, outflow and roadside drainage, 20 Oct 1983, *Nixon 12661* (ASTC,SHST,BRIT), 15 Oct 1983, *Mahler 9690* (ASTC, BRIT), 30 Oct 1983, *Mahler 9709* (BRIT), 16 Oct 1995, *Nesom A95-1* (MISS, NLU,NO,SHST) and *Nesom A95-2* and *A95-5*, putative hybrids, see comments in text (SHST); ca. 2 mi NNW of jct of Hwys 3309 and 315 on Hwy 315, natural marsh to swamp area, 20 Oct 1983, *Nixon 12662* (ASTC,BRIT); Palestine, sandy open swamp, 15 Sep 1918, *Palmer 14584* (US). FRANKLIN COUNTY: ca. 1.7 mi E of jct Texas Rte 115 and Hwy 21 on Rte 115, S side of road, spring/seepage bog, 11 Nov 1996, *Singhurst 4926* (BAYLU). HENDERSON COUNTY: 1.6 mi NE of intersect of Hwys 31 and 317, SE side of the NE bound lane of Hwy 31, SW of the Athens Fish & Game Club Lake, NE of Athens, marshy drainage ditch (perhaps a remnant natural feature) between forest edge and hwy, 1 Nov 1995, *Poole 4283* (SHST) and *4285*, a putative hybrid, see comments in text (SHST); ca. 5.5 mi WSW of jct. of Hwy 31 and FM 1804, on S side of Hwy 31, deep xeric sand hill with spring seepage, 27 Oct 1995, *Singhurst 3903* (SHST). HOPKINS COUNTY: ca. 1.1 mi from jct Texas Rte 900 and FM 3019 on FM 3019, W side of road, spring/seepage bog, 11 Nov 1996, *Singhurst 4925* (BAYLU). SMITH COUNTY: 8 mi NE of Tyler, Camp Fannin, wet pockets at edge of meadow below hospital, 15 Oct 1943, *Moore 564* (US); ca. 0.4 mi SE of jct Hwys 110 and 2016 on Hwy 110 NW of Tyler, open seepage area along hwy above creek, 4 Nov 1983, *Nixon 12659* (ASTC,SHST, BRIT) and *Mahler 9710* (BRIT,TAMU); 1.8 mi E of intersect of I-20 and Hwy 14, N side of W-bound access road of I-20, damp, polluted drainage ditch (perhaps a remnant natural feature), 28 Oct 1995, *Poole 4281* (SHST); 0.6 mi N of intersect of Lake Park Drive and Hwy 110, E side of LP Drive, N side of Tyler, marshy drainage, 1 Nov 1995, *Poole 4282* (SHST); 0.5 mi S of jct of FM 849 (Co. Rd 431) and Co Rd 4118, N side of FM 849, just W of drainage between Stewart Lakes and Tomlin Lake, NW of Lindale, marshy drainage ditch at edge of woodland along hwy right-of-way, 3 Nov 1995, *Poole 4291* (SHST); 16 mi NW of Tyler [courthouse], 19 Oct 1947, *Shinners 9504* (HOLOTYPE: SMU). VAN ZANDT COUNTY: ca. 3.8 mi SSE of jct of Hwys 858 and 279 in Ben Wheeler on Hwy 279, drainage area from small lake, N end of lake, both sides of road, 26 Oct 1983, *Nixon & Ward 12663* (ASTC,SHST, BRIT), 12 Oct 1952, *Daly 157* (BRIT); 16 Oct 1995, *Nesom A95-8* (NCU,SHST, TEX). WOOD COUNTY: on Hwy 154 0.3 mi E of jct with Lake Lydia Road (FM 3230), 3.5 mi E of jct Hwys 154 and 37 E of Quitman, seepage area along open roadside, below earthen tank on N side of road, 13 Oct 1984, *Nixon 14006* (ASTC, BRIT), 15 Oct 1984, *Nixon 13969* (ASTC,SHST,BRIT); 16 Oct 1995, *Nesom A95-9* (SHST); on Hwy 154, 0.6 mi E [W] from its jct with Lake Lydia Road (FM 3230), open seepage along hwy for ca. 100 m, 13 Oct 1984, *Nixon 14005* (ASTC,SHST, BRIT); ca. 4.7 mi W of jct Hwys 14 and 154 on Hwy 154, open seepage area along road, 16 Oct 1984, *Nixon 14022* (ASTC); near Co. Rd. 3235 and its jct with the E

end of Lake Lydia, wet open creek bottom with ponds, 27 Oct 1984, *Nixon 14028* (ASTC,SHST,BRIT); edge of marsh on SE side of Lake Lydia on Co. Rd. 3235, across rd from housing development on edge of lake, 16 Oct 1995, *Nesom A95-10* (SHST,TEX); ca. 1.5 mi E of jct Hwy 778 and Co. Rd. 3860 on 3860 E of its jct with Red Branch, N side of road near E edge of pond, open seepages at margin of a woodland, 19 Oct 1984, *Nixon 14029* (ASTC,SHST,BRIT); ca. 0.8 mi N of jct Hwy 49 and Co. Rd. 3270 on 3270, open seepage area along roadside near creek, 3 Nov 1984, *Nixon 14030* (ASTC,BRIT); ca. 0.5 mi NE of jct Co. Rd. 3235 and 3245, ca. 100 m from Co. Rd. 3245, ca. 0.4 mi upstream from end of SE arm of Lake Lydia, marshy to brushy glades with springs and seepages, 27 Oct 1984, *Nixon 14038* (ASTC), Oct 1988, *Orzell & Bridges 8063* (TEX); 0.7 mi NNW of intersct of Hwy 14 and Co. Rd 3260 and 1.0 mi SSE of intersct of Hwys 14 and 154, E side of Hwy 14, S of Buck Creek, marshy drainage, 27 Oct 1995, *Poole 4279* (SHST); 0.3 mi E of intersct of Hwys 14 and 154, primarily on N side of Hwy 154, drainage of spring-fed marsh, 27 Oct 1995, *Poole 4280* (SHST); ca. 5 m NE of jct. of Loop 564 and Hwy 64 at Mineola, deep xeric sand hill with spring seepage, 1 Nov 1995, *Singhurst 4379* (SHST).

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FORMER DISTRIBUTION OF PRAIRIES IN NORTHERN LOUISIANA

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ABSTRACT

Using historical accounts, land survey records, maps, geological surveys, soil maps, and floristic surveys, we plotted the former distribution of prairies in north and central Louisiana. Prairies were scattered across the area, but most have disappeared due to anthropogenic causes.

KEY WORDS: prairie, Louisiana

INTRODUCTION

Before Europeans reached the New World, forest was almost continuous from the Atlantic Ocean to east Texas. But within this forest were open communities such as bogs, prairies, and sandylands (DeSelm & Murdock 1993).

Rostlund (1957) used historical records to interpret the native vegetation of the southeastern United States. He was especially interested in prairies, notably extensive prairies and concentrations of them. In addition to confirming the existence of large prairies and localized concentrations, he found that there were numerous isolated prairies scattered throughout the southeast. Prairies were not rare, but rather were ubiquitous (Barden 1997). Most of these prairies "were small, only a few acres to a square mile in extent, but some of them were much larger" (Rostlund 1957:407).

Rostlund concentrated on the area between the Mississippi River and the Atlantic Ocean, and, apparently for lack of information, virtually ignored Louisiana and Arkansas (Irving *et al.* 1980; Foti 1989) as have most subsequent authors concerned with southeastern prairies (*e.g.*, DeSelm & Murdock 1993).

There are two recognized prairie types in Louisiana. The "coastal" or "Cajun" prairies of southwestern Louisiana (Newton 1972; Smeins *et al.* 1992; DeSelm & Murdock 1993) were once very extensive, consisting of between two and three million acres, but today they are almost gone and fewer than 200 acres remain (Allen & Vidrine 1989; Larry Allain, pers. comm.).

The calcareous or "isolated" prairies of central and northern Louisiana belong to the type Rostlund (1957) described farther east, and it is these with which we will be concerned. Floristically these prairies are classifiable as tallgrass prairies with such characteristic grasses as *Andropogon gerardii* Vitman, *Panicum virgatum* L., *Schizachyrium scoparium* (Michx.) Nash, *Sorghastrum nutans* (L.) Nash, and *Sporobolus asper* (Michx.) Kunth. Families especially well represented are the Apiaceae, Asteraceae, Fabaceae, Lamiaceae, Poaceae, Rosaceae, and Scrophulariaceae (Smith 1988; Smith *et al.* 1989; MacRoberts & MacRoberts 1995, 1996a, 1996b, 1997).

Using land surveys, geological surveys, historical records, maps, and recent botanical surveys, we attempt to reconstruct the former distribution of prairies in northern Louisiana.

METHODS

We examined the accounts of explorers and surveyors (Bartram 1792; Featherman 1871; Freeman & Custis 1806 [Flores 1984]; Lockett 1876; LePage Du Pratz 1774; Dunbar & Hunter 1804 [McDermott 1963; Rowland 1930]), studied the earliest (1820-1850) land survey records, aerial photographs, and maps (Darby 1816; Hardee 1895; Lockett 1872, 1884; Tanner 1839), geological and soil surveys (Anderson 1993; Chawner 1936; Fisk 1938, 1940; Harris & Veatch 1899a, 1899b; Hilgard 1869; Huner 1939; Kerr *et al.* 1925; Smies *et al.* 1918; Lurch 1893), and published and unpublished botanical and ecological descriptions of north and central Louisiana (Brown n.d., 1941a, 1941b, 1953; Delcourt 1976; Thomas 1986; Smith *et al.* 1989; Hart & Lester 1993; Norman 1991; Louisiana Natural Heritage Program records, MacRoberts & MacRoberts 1995, 1996a, 1996b, 1997; MacRoberts *et al.* 1997; Martin & Smith 1991; Teague & Wendt 1994). Especially important were the field notes of C.A. Brown, who studied Louisiana prairies in the 1930's and 1940's and who left numerous records now housed in the LSU herbarium and the LSU Archives, Hill Memorial Library.

By north and central Louisiana is meant all parishes north of base line T1N, which runs through Vernon, Rapides, Avoyelles, and Concordia parishes.

The determination of what constitutes a prairie in the historical records is never certain. However, comparing current occurrences with what land surveyors and explorers said about them indicates that early explorers and surveyors were distinguishing prairies on basically the same characteristics we use today: an open, naturally treeless area with a rich herbaceous layer dominated by grasses, composites, and legumes. The soil is calcareous clays with a high pH. Lockett (1872 [1969:71]) captures the essence of this in his brief description of Prairie du Cote near Columbia:

"The prairie is almost exactly circular in shape and about one mile in diameter; its soil is a light, yellow loam. Its surface is gently undulating, covered with a luxuriant growth of grass and thousands of bright wild flowers, and is free from trees except for a few clumps of thick-growing hawthorns."

Any survey of the sort we have attempted will miss many prairies. If a prairie was small, explorers did not comment on it. If it did not fall on a survey line, land surveyors did not mark it, and some surveyors did not record prairies at all. If European settlement had already occurred, prairies often were converted quickly to fields or pasture and were marked as such by surveyors. Thus, the mesh of our survey is large, and our results are influenced by it.

But our purpose is not to pin down the exact location of every prairie in north and central Louisiana --- the sources do not always agree on prairie location or size. Instead, we aim simply to show the basic distribution of Louisiana prairies: for those wishing more detailed information about specific sites, the original sources should be consulted.

RESULTS

Figure 1 shows the nineteenth century distribution of prairies in Louisiana. While we are concentrating on the northern prairies, we have, for the sake of completeness, indicated the approximate distribution of the Cajun prairies (based on current information provided by the National Wetlands Research Center; see also Smeins *et al.* 1992; DeSelm & Murdock 1993; Newton 1972) as well as the location of two isolated prairies that fall below T1N: Bayou Rouge Prairie in Avoyelles Parish, and Buhler's Prairie in East Baton Rouge Parish (see also Newton 1972).

North of T1N, many prairies appear to have been truly isolated; whereas others consisted of several closely related or adjoining sites. For example, just east of Bellevue, Bossier Parish, there was a cluster of three or four prairies, each about one half to one square mile in extent. Another cluster occurred near Calvin, Winn Parish, where today there is a belt of about 45 prairies, many of which are now disjunct remnants of once larger connected openings (Smith *et al.* 1989).

In the nineteenth century, prairies in north and central Louisiana ranged in size from only a few acres to five or so square miles. Some of the largest prairies are given in Table 1. The size estimate must be approximate given the often conflicting historical accounts.

While it never will be possible to give a precise figure for the number of acres of isolated prairie in northern Louisiana in former times, on the basis of our research we can certainly say that at the beginning of the last century there were not fewer than 30,000 acres and probably closer to 40,000 or 50,000 acres.

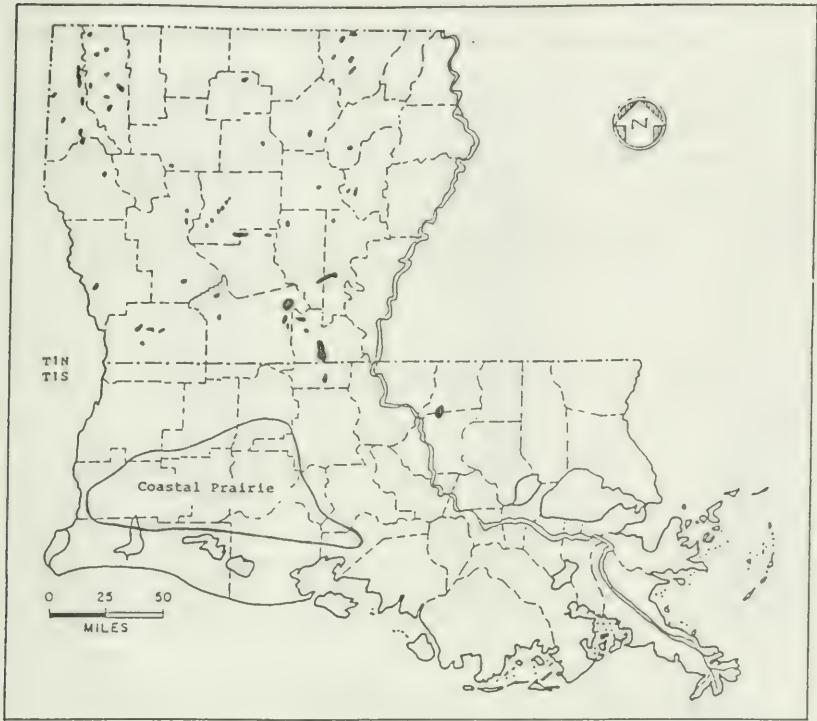


Figure 1. Native distribution of Louisiana prairies with special emphasis on north of baseline T1N.

Table 1. Some of the largest prairies (and groups of prairies) in northern Louisiana in former times.

Prairie Name	Parish	Size (approximate)
Anacoco	Vernon	1000 acres
Avoyelles	Avoyelles	Several square miles
Bartram's	Grant	1300 acres
Bellevue	Bossier	1600 acres
Boeuf	Franklin	Several square miles
Burned	Franklin	1000 acres
Caddo	Caddo	3200 acres
Catahoula	LaSalle	3200 acres
Clear Lake	Natchitoches	300 acres
duBois	Ouachita	1000 acres
duCote	Caldwell	600 acres
Holloway	Rapides	Several square miles
Jefferson	Morehouse	Several square miles
Keiffer	Winn	500 acres
Mer Rouge	Morehouse	1900 acres
Pendarvis	LaSalle	600 acres
Seymore	Morehouse	800 acres
Tanock's	Winn/Grant	700 acres

Correlating prairie distribution with geological substrate indicates that prairies occur on several formations. Some occur on recent Pleistocene floodplain terraces, notably along the Red River; whereas others are found on Tertiary deposits, including Fleming, Jackson, and Cook Mountain (Smith 1988). All soils are alkaline (pH 7.5-8.0) stiff clays high in calcium (3500-8000 ppm) with high shrink-swell characteristics. Soils often contain marine shells and limestone nodules (Smith 1988; Smith *et al.* 1989; MacRoberts & MacRoberts 1995). Brown (1953) pointed out that the soils in the majority of the prairies he visited contained shells and an unusually compact layer 6 to 36 inches below the surface.

DISCUSSION

We find the main features of the isolated or calcareous prairies in north Louisiana to be essentially the same as those described by Rostlund (1957) for the southeastern United States. In north Louisiana, as in the remainder of the southeast, there were both local concentrations of prairies and isolated prairies. As the early observers, for example, Lockett (1876), recognized there is a band of "Hog Wallow Land" from Vernon Parish to central Louisiana and northward to Arkansas along which occurred numerous prairies, sometimes in groups, sometimes in isolation. Another major

concentration of prairies occurred in northwestern Louisiana in Caddo and Bossier parishes.

Some prairies were quite large, others were very small, and it is undoubtedly the case that our records of the larger are more complete than for the smaller. Explorers were more likely to mention the largest prairies, and land surveys missed many of the smaller sites. Thus, prairies in the size class of fewer than forty acres have tended to fall through the cracks while those over a square mile are recorded repeatedly by explorers and land surveyors.

In pre-European times, Louisiana had about two and a half million acres of prairie, most of which was confined to the southern part of the state (Table 2).

Table 2. Pre-European and present day prairie in Louisiana and surrounding areas.

State	Acres		Loss (%)
	Pre-European	Today	
ARKANSAS	1,000,000	3600	99.64
LOUISIANA			
Northern	40,000	300	99.00
Coastal	2,500,00	150	99.99
MISSISSIPPI	?	?	?
TEXAS			
Blackland	12,000,000	5000	99.95
Coastal	7,000,000	?	99.00

The loss of prairie in Louisiana and throughout the south is comparable to the loss of prairie in the Midwest where less than 1% --- in most areas usually no more than 0.01% --- remains (Whitney 1994; Noss 1997). There are no estimates for Mississippi, which had extensive prairies in pre-European times and which today has a few, fine remnants. By the time the land surveys were made in the 1820's and 1830's, European settlement was heavy, and most prairies were already under cultivation (Ken Gordon, pers. comm.). However, on the Bienville National Forest in the Jackson Prairie Belt of central Mississippi, about 800 acres of prairie remain in 54 sites that range in size from fewer than one to 160 acres (Gordon & Wiseman 1989; Moran *et al.* 1997).

For Louisiana the story is the same. Almost all prairies were in cultivation, pasture, grazing, forestry, or urban development by the twentieth century.

In Arkansas, the pace of prairie loss was slower but the result the same. It was not until early in this century that the Grand Prairie began to be extensively cultivated, but today, only very small fragments of it remain (Irving *et al.* 1980).

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**PERITYLE (ASTERACEAE, HELENIEAE), NEW SPECIES (FROM MEXICO),
NEW COMBINATION, AND NOTES**

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ABSTRACT

Perityle pseudociliata, a new species from northwestern Chihuahua, México, is described. Superficially, *P. pseudociliata* resembles *P. ciliata* of central Arizona. A new combination, *P. gilensis* var. *longilobus*, is made for *Laphamia gilensis* subsp. *longilobus* W.E. Niles. Recent collections have provided new morphological and cytological information for *P. ambrosiifolia* and a range extension for *P. huecoensis*.

KEY WORDS: Asteraceae, Helenieae, *Perityle*, México, Arizona, Texas, systematics

Preparation of a treatment of *Perityle* for the Flora of North America and a review of United States species that extend into México has revealed the existence of an undescribed species in northwest Chihuahua. Description of the new taxon, the need for a formal nomenclatural change, and miscellaneous notes have inspired the present collage of information about *Perityle*.

Perityle pseudociliata A.M. Powell & S.C. Yarborough, spec. nov. Figure 1.
TYPE: MEXICO. Chihuahua: 26 km by winding road NW of Colonia Juárez in the "Tinaja", a canyon through the foothills of the Sierra Madre Occidental, 30° 22' N, 108° 12' W, 1750 m, oak scrub in the canyon bottom, "locally steep wall of the canyon through extrusive igneous rocks, this plant in a crevice with hardly any soil, no close associates, growing alone in crevice, rare, shrublet, 1-2 dm, perennial," 28 Jul 1972, W.E. Wilson, L.A. & M. C. Johnston 8480 (HOLOTYPE: TEX!).

Plantae suffruticosae, 1-2 dm altae villosae. Laminae foliorum 5-10 mm longae, 5-10 mm latae, deltatae, marginibus laceratis-lobatis. Capitula plerumque solitaria in axibus foliorum, radiata, ca. 5 mm alta, phyllariis 10-12. Flores radiati 6-8, ligulis albis, ca. 3 mm longis, ca. 2 mm latis. Flores

discorum 32-40, corollis luteis, 2.2-2.8 mm longis. Pappus ex 2 setis tenuibus, 0.5-1.5 mm longis, corollae vestigiali ex squamellis compositus. Achenia atra, anguste oblanceolata, 2.0-2.7 mm longa, marginibus tenuiter callosis, marginibus et paginis cum pilis brevibus et adpressis.

Plants suffruticose, 1-2 dm high, moderately to densely villous, glandular-punctate. Stems moderately to densely leafy. Leaves opposite or alternate; petioles 5-10 mm long; leaf blades 50-10 mm wide, narrowly to broadly deltoid, margins lacerate-lobed. Heads typically solitary in leaf axils; peduncles 5-10 mm long. Heads radiate, ca. 5 mm high and wide, involucre campanulate, phyllaries 10-12, linear-lanceolate to lanceolate, 3-4 mm long, 0.7-1.0 mm wide, densely villous. Ray flowers 6-8, pistillate and fertile, ligules white, narrowly to broadly obovate, ca. 3 mm long, 2 mm wide. Disc flowers 32-40, corollas yellow, glandular 2.2-2.8 mm long, tubes generally shorter than the cylindric to narrowly funnelform throats, lobes 0.1-0.2 mm long. Pappus typically of 2 delicate, unequal, finely barbellate bristles, 0.5-1.5 mm long, plus a minute crown of vestigial, lacinate, hyaline squamellae or callous tissue. Achenes black, narrowly oblanceolate, 2.0-2.7 mm long, margins thinly calloused, and margin surfaces with short, dense, appressed hairs. Chromosome number unknown.

Perityle pseudociliata is known from a single collection 26 km northwest of Colonia Juárez in northwest Chihuahua, México. The new taxon is similar in leaf and capitulum morphology to *P. ciliata* of central Arizona. Both *P. pseudociliata* and *P. ciliata* have basically deltoid lacerate-lobed leaf blades and heads with white ligules and yellow disc corollas. The two taxa might be considered as merely disjunct populations of *P. ciliata* except that the achene and pappus morphology of *P. pseudociliata* is most like that of *Perityle* sect. *Laphamia* (Powell 1973), while the achene and pappus morphology of *P. ciliata* is characteristic of *Perityle* sect. *Perityle* (Powell 1974). In sect. *Laphamia* the achene margins are usually sparsely short-pubescent and the pappus may be absent, consist of one or two (or more) bristles only, or consist of a crown of inconspicuous vestigial squamellae with or without bristles. In sect. *Perityle* the achene margins typically are profusely ciliate and the pappus consists of one or two (or more) bristles and a crown of squamellae. Previously, heads with white ligules in the genus *Perityle*, were known only in certain species of sect. *Perityle*.

Another white rayed species of *Perityle* with laphamioid achenes has been collected near Colonia Juárez, i.e., *Laphamia scopulorum* M.E. Jones, Colonia Juárez, 6000 ft., upper edge of lower Temperate Life Zone, 12 Sep 1903, M.E. Jones s.n. This taxon was tentatively placed as a synonym of *P. coronopifolia* by Powell (1974), and more recently has been recognized by Turner (*Comps of Mexico*, 1998, in prep.) as a distinct species, *P. scopulorum*. *Perityle scopulorum* is known only from a single collection near Colonia Juárez, México, at a site which can be assumed to be within approximately 26 km of the only known locality for *P. pseudociliata*. *Perityle scopulorum* is similar in leaf and capitulum morphology to *P. coronopifolia* of southeastern Arizona and southwestern New Mexico. One collection tentatively identified as *P. coronopifolia* has been reported from Chihuahua, México. The leaves of *P. scopulorum* and *P. coronopifolia* are highly dissected and both have white radiate heads. The two taxa might be considered as merely disjunct populations or varieties of the same taxon except that the achene and pappus morphology of *P. scopulorum* is like that of sect. *Laphamia* (and the ultimate leaf segments are more

slender, linear-filiform), and the achene and pappus morphology of *P. coronopifolia* is characteristic of sect. *Perityle*.

The Chihuahuan taxa with laphamioid achenes and white-rayed heads, *Perityle pseudociliata* and *P. scopulorum*, appear to be closely related species with distinctive leaf morphologies. These two species also differ somewhat in their achene characters: slightly longer and narrowly oblanceolate with rounded shoulders in *P. pseudociliata*; slightly shorter and linear-oblong with truncate shoulders in *P. scopulorum*. The latter also appears to have more evident hyaline pappus scales than does *P. pseudociliata*. The leaf characters of *P. pseudociliata* and *P. scopulorum* are as distinctive as is the leaf morphology, between the relatively widespread, but geographically isolated and closely related *P. ciliata* and *P. coronopifolia* of Arizona and New Mexico. Reduced achene and pappus forms are known in certain species of *Perityle* sect. *Perityle* (Powell 1974), i.e., achene margins with shorter hairs and pappus squamellae reduced in size so that the fruits resemble those of sect. *Laphamia*. One species, *P. lloydii* Robinson & Fern., is characterized by reduced achenes and pappus. *Perityle pseudociliata* and *P. scopulorum* may be interpreted as geographically isolated achene forms of *P. ciliata* and *P. coronopifolia*, respectively, or the two geographically proximal Chihuahuan entities might be viewed as ancestral laphamioid taxa. In either case, we believe that the description of *P. pseudociliata* is the taxonomic equivalent of recognizing *P. scopulorum* as a distinct species.

Finally, it should be noted that a collection (Mayfield *et al.* 180 [TEX]) tentatively recognized as *Perityle coronopifolia* from Chihuahua (Turner 1998, Comps of Mexico, in prep.), actually differs from *P. coronopifolia* in the United States in a number of characters (longer petioles and peduncles, capitulescences of only 1-2 heads, longer achenes that are somewhat perityloid with cilia on the margins but no crown of hyaline scales), but clearly closely resembles *P. coronopifolia* in other features including leaf shape and capitulum morphology; unfortunately, the Mayfield collection lacks mature achenes. Its geographic position lies farther south by ca. 80 km than known collections of *P. scopulorum* and *P. pseudociliata*. Much additional collection on bluffs and along escarpments in north central México is needed to resolve some of the problems posed here, especially since geographic speciation predominates in *Perityle* (Powell 1973).

Perityle gilensis (M.E. Jones) Macbride var. *longilobus* (W.E. Niles) A.M. Powell & S.C. Yarborough, *comb. nov.* BASIONYM: *Laphamia gilensis* M.E. Jones subsp. *longilobus* W.E. Niles, Mem. N.Y. Bot. Garden 21:51-54. 1970. TYPE: UNITED STATES. Arizona: Gila Co., Lowermost, north-facing cliffs of Salt River Canyon, near crossing of U.S. highway 60, ca. 915 m, 13 Oct 1964, W.E. Niles 453 (HOLOTYPE: ARIZ).

Perityle gilensis (M.E. Jones) Macbride var. *salensis* A.M. Powell, Sida 5:104-106. 1973. TYPE: UNITED STATES. Arizona: Gila Co., Salt River Canyon between Globe and Show Low, 18 Aug 1969, S. Sikes 428 (HOLOTYPE: SRSC; Isotypes: SMU,TEX).

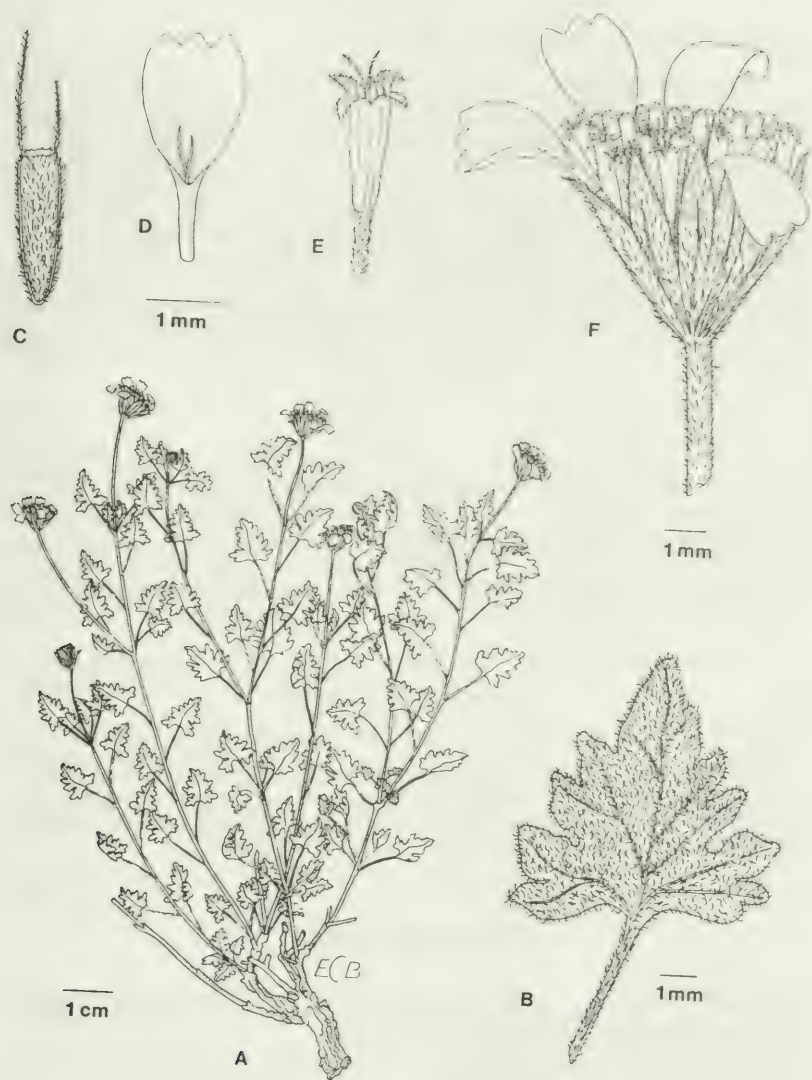


Figure 1. *Perityle pseudociliata*, (A) habit, (B) leaf, (C) achene with pappus, (D) ray corolla, (E) disc corolla, (F) head. From W.E. Wilson, L.A. & M.C. Johnston 8480.

Perityle ambrosiifolia A.M. Powell & S.C. Yarborough

Eleven new collections of this recently described taxon (Powell & Yarborough 1994) have been examined, several of them for chromosome number (Arizona, Greenlee Co., Stargo, along Eagle Creek, upper Gila River drainage, W of Clifton and Morenci, near Graham-Greenlee Co. line, 25 Aug 1997, L.A. McGill 6948-6958 [SRSC]). In specimens of *Perityle ambrosiifolia* previously examined (Powell & Yarborough 1994), most had achenes with one pappus bristle, while achenes without a pappus bristle were rarely observed. In the McGill collections, about one-half of the plants had achenes without pappus bristles. Also, ray florets were not present in any of the McGill collections. Ray florets, apparently with reduced ligules, are present in occasional populations of *P. ambrosiifolia*. The color of the ray florets, often an important character in *Perityle*, still is unknown (Powell & Yarborough 1994). The chromosome number of *P. ambrosiifolia* tentatively was determined as $2n = 34$ (McGill 6948, $n = \text{ca. } 17$; McGill 6950, $n = \text{ca. } 17$).

Perityle huecoensis A. M. Powell

This species, previously known only from the Hueco Mountains in El Paso County, Texas, has been collected in adjacent México: Chihuahua, Mcpio. Juárez, Sierra Juárez; extreme N end of Sierra Juárez, N-facing cliffs, 17 Apr 1992, Spellenberg & Bacon 10994 (NMC,MEXU); middle of range, E side, NE-facing limestone cliff, 1450 m, 29 May 1993, Spellenberg, Brouillet, & Kearns 11812 (NMC,MEXU,DC,SRSC,TEX).

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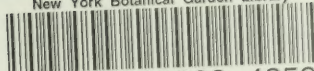
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